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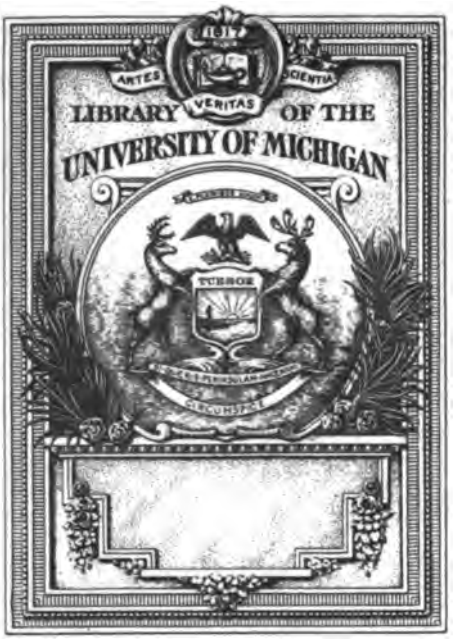

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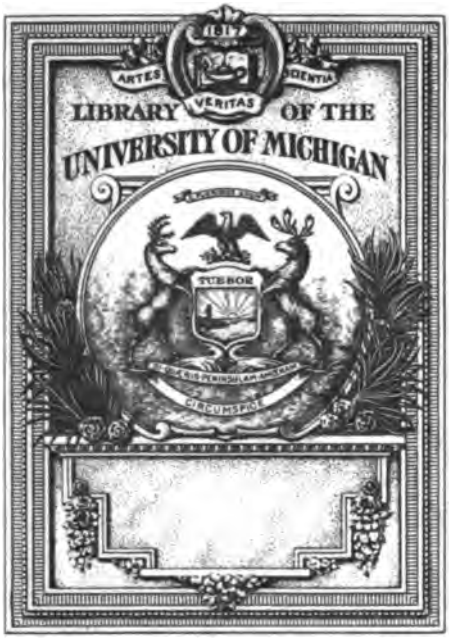

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ANNUAL REPORTS

OF THE

DEPARTMENT OF THE INTERIOR

FOR THE

FISCAL YEAR ENDED JUNE 30, 1899.

MISCELLANEOUS REPORTS.
PART II.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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REPORT

OF

THE GOVERNOR OF ALASKA.

EXECUTIVE OFFICE,
Sitka, Alaska, October 18, 1899.

SIR: I have the honor to transmit herewith my annual report on affairs in Alaska.

RESOURCES.

FISH.

The salmon and salmon fisheries.—Those who are deeply interested in this subject would do well to obtain the publications of the United States Commisioner of Fish and Fisheries, especially those reports of Dr. Tarleton H. Bean, Captain Tanner, and Capt. Jefferson F. Moser, the latter of whom are officers in the United States Navy and have been in command of the steamer *Albatross*, the vessel which belongs to the Fish Commission. Many things are known about the salmon, but very much remains yet to be learned. At certain seasons of the year they come in from the sea and play around the mouths or estuaries of fresh-water streams, and after a while attempt to ascend those streams for the purpose of spawning and propagating their kind. They seem to prefer such streams as have their sources in lakes, and it is wonderful to behold the efforts which they make to shoot rapids, ascend falls, and get over obstructions to reach the desired spot for spawning. It is claimed that very few fish after these efforts return to the sea. It is a life and death struggle for them.

If anyone will take the trouble to place a good map of Alaska before him, and study the coast line from its initial point around to the mouth of the Yukon, he will begin to understand what a wonderful resource the salmon industry should be. The large and small islands are visited by them wherever there is a stream which they can ascend, as are also the creeks and rivers of the mainland.

It was the intention of the Fish Commission to visit all these streams, run surveys, take photographs, and obtain all possible information in regard to actual production of fish and the capacity of each stream. But such a work requires much time and care. The *Albatross* has been detailed to other work. Such preliminary labor is necessary when the Government comes to take the matter in hand and see that the streams are constantly replenished.

The canning of salmon began in the spring of 1878, two small canneries being erected that year. However, only a small business was done until 1882, when the first cannery was built on Karluk River, Kadiak Island. In 1883 several canneries were built, and each year

one or more have been added. Some have been abandoned and a few have been burned to the ground. The present year nearly all the canneries which were in operation last year have been working, with the addition of some new ones. The Baranoff Packing Company sold out its plant and it was removed.

The pack last year was 974,601 cases, 20,518 barrels, and 4,300 half barrels; total value, $3,544,128. From the most reliable information obtainable at the writing of this report 984,150 cases and 12,000 barrels of salt fish were already packed. It would be safe to say that not less than 1,000,000 cases and 15,000 barrels will be the pack for this year, which, at a valuation of $4 per case and $8 per barrel, would amount to $4,120,000.

There have been no laws or rules regulating the location of these canneries; each canning company has built where it pleased, without let or hindrance. In some places, like Karluk, Kadiak Island, many canneries have been built close together, and there has been the keenest rivalry as to which shall put up the largest pack.

Some of the streams have been wonderfully prolific. The pack at Karluk River in 1894 was 229,284 cases; in 1896, 226,428 cases, and in 1897, 154,262 cases. The business was profitable, and has been conducted in a spirit of rivalry and competition which has been in defiance of the laws on the statute books and of all safeguards for the proper protection and propagation of the fish. Nobody knows better than the canning people that this has been a short-sighted policy.

This same Karluk River in 1898 produced about 60,000 cases, and the pack this year will probably not amount to over 40,000 cases.

It should be said here that the Alaska Packers' Association, seeing what was bound to come, started a hatchery on the Karluk River, and have been conducting it for several years at a great expense, but so far there is no sign of replenishment. There can be no possible doubt that if the fishing continues a few years longer as it is now going on the streams will be depleted.

It will be well to quote here what Captain Moser says on the subject:

DEPLETION OF STREAMS.

When a person interested in a cannnery is questioned regarding the decrease of salmon in Alaskan waters, he is likely to assure you at once that there are just as many salmon in the streams as there ever were, and begins his proofs by citing years like 1896 when there was a large run of redfish in Alaska; but any disinterested authority on the subject will say that the streams of Alaska are becoming depleted. While it can hardly be said that the streams will fail entirely within a few years, there is no doubt that the average runs show fewer fish year by year, and if the laws are not amended and enforced the time will come in the not very distant future when the canneries must suffer through their own actions.

It is a difficult matter to furnish convincing proofs to those who do not wish to be convinced, and any argument may fail with those who are interested commercially. It is also difficult to establish proofs by statistics, because accurate stream statistics, as a rule, can not be obtained; and, as to packs, the canneries have multiplied in numbers and many of them have been so enlarged that no comparison can be made. The causes of the depletion are the barricading of streams and overfishing—in other words, illegal fishing.

RELATIONS BETWEEN THE SALMON FISHERIES AND THE INDIANS.

Whenever the *Albatross* anchored near any locality either permanently or temporarily inhabited by natives, a delegation of the older men or chiefs came on board and requested an audience. The powwows which followed invariably took the form of relating the oppression of the white man. At Klinkwan, Chacon, Klakas, Klawak, Metlakahtla, Kasaan, Karta Bay, and, in fact, everwhere, the Indians were greatly exercised over their condition, and notwithstanding that

they were repeatedly informed that the Fish Commission party had nothing to do with the execution of the law and was merely in the country for the purpose of examining the fisheries, they insisted that, as we were Government officers, we must hear them.

The permanent Indian villages during the spring and summer months are practically deserted except by a few old people, the young men and women being away, living in camps and curing their winter supply during the spring, and, when the canneries open, fishing for them or doing work about them. The canneries at Klawak and Metlakahtla are operated by Indians, the former drawing quite a number from Howkan and Klinkwan. At Chacon the Indians from Kasaan were curing halibut, and they were again met at Hunter Bay, where they had come for cannery work. It is only during the winter that the permanent villages are fully inhabited.

They are essentially fish-eating Indians, depending upon the streams of the country for a large amount of food supply. These streams, under their own administration, for centuries have belonged to certain tribes or clans settled in the vicinity, and their rights in these streams have never been infringed upon until the advent of the whites. No Indians would fish in a stream not their own except by invitation, and they can not understand how those of a higher civilization should be—as they regard it—less honorable than their own savage kind. They claim the white man is crowding them from their homes, robbing them of their ancestral rights, taking away their fish by shiploads; that their streams must soon become exhausted; that the Indian will have no supply to maintain himself and family and that starvation must follow.

The natives urge that the law prohibiting them from owning mining claims is very hard to endure; that they wear the same clothes, eat the same food, obey the same laws as the white man, and are far more orderly than the white communities, and that they should have the same rights. They acknowledge the white man's superiority; all they want is suitable encouragement to imitate him. The Prince of Wales Indians also complained against the Metlakahtla community, stating that the latter are foreigners and come to their island, cut out the best timber, and carry it to their sawmill at Metlakahtla. While acknowledging the Metlakahtlans as superior in intelligence, they say they would gladly embrace the same opportunities.

From the Indians' standpoint, their complaints are undoubtedly well founded, but history will no doubt repeat itself here, as in other portions of our country, where the aborigines have come in contact with the civilizing influence of the white man, where rum, disease, and mercenary dealings have slowly but surely exterminated them. My own sympathy is with the Indian, and I would gladly recommend, if the way were clear, the establishment of ownership in streams; but it is impracticable, and I can only ask for him a consideration of his claim and, whatever law is framed, that a liberal balance be thrown in his favor.

This testimony comes from a man who is without interest or prejudice in the matter, and who is well qualified to give expert testimony. The cannery people, themselves, will hardly seriously deny that the greater part of their fishing has been illegal. This brings us to the question of the relation of these fisheries to the natives.

The following letters have come to this office this season:

FORT WRANGELL, ALASKA, *June 30, 1899.*

DEAR SIR: We, the undersigned, natives of Wrangell, Alaska, have come together to write you this letter. This being the first time we ever asked you, Governor, to help us in our trouble. We each one look to you, Governor, as our chief. We only ask for justice according to the laws of the United States. We are very thankful that the Government of the United States has such a law as to protect us with our lands and salmon streams, especially salmon creeks and hunting grounds. For all our living and our children's living comes from fishing and hunting. And so if the white man takes the salmon creeks away from us, where do you suppose, Governor, we Indians would make our living—we old Indians, such as old Arrow Kohwow and lots other Indians that can not talk a word of English or not able to work for white man for wages due? They simply have to starve or else look to the Government for support; if not we will have to take it in our own hands to keep such bad white man off our salmon streams. And then suppose the Government then will look into it right away, and we Indians will have to get punished for everything we do. So, to avoid all troubles, we, the undersigned, ask you this favor, you being governor of our land and a good friend of Indians, besides you being well acquainted with our ways and what we own.

Now we will tell you, Governor, that one of our friend, Aarow Kohwow—we suppose you know him, one of the old Christians that was with David Towyatt and Moses Lewis—Aarow and Moses Lewis own a place call Au-Aw, which means "Town of all Towns," known as one of the oldest towns, where old Aarow's family used to go to dry salmon ever since God created us, and it went from one family up to Aarow, which he now has it in his hands for over twenty-four years, till few years ago, when the cannery was build here. Two years afterwards the superintendent, J. Batler, send men over to the place to fish every year, about ten days every year, while Aarow stays on it every about seven or eight months, hunt, fish, and tend to other thing; and now J. Batler claims he owns the place and want to keep the other Indians away from there. He, J. Batler, have keeped us away from there already. J. Babler tried to buy it from Aarow, but Aarow would not do it, so this year he want to lease it from Aarow, provided Aarow keep all other Indians away from the salmon creek; that Aarow would not do so, the trouble comes in. J. Babler break and saw down Aarow's fence and got in on Aarow's garden, using it for camp ground. So Aarow made complaint, but the trial is put off till the *Queen's* return. All we ask you is to see the United States district attorney and give us a fair show and justice. We Indians of Wrangell can say this much, that we never tried to keep any white man away from fishing in the creeks; they have always fished every place; but when they tried to keep us out and try to take the ground away from us, we think we have right to kick. This is the third creek that white man tries to take away from us. There are three good creeks where we all used to fish; now one white man has it all in his possession and puts a fence across each creek every year, and we Indians left out. Now such things ought to be looked after. This have been going on every year for over seven years. So if we lose this case we will have to be keeped away from this creek by one white man. Let us have the creeks where we get our living and hunting grounds; that is all we ask of the Government. This letter represents all the natives of Wrangell and others near by. Let us hear from you on return boat. We remain your humble servants.

GEORGE (his x mark) SHAKES,
TOMYATT (his x mark),
JOHN (his x mark) KADISHAU,
ANDREW (his x mark) KEAWQUITZ,
SHA KE NAIGH (his x mark),
JACK (his x mark) JOHNSON,
AARON (his x mark) KOHNOW,
JACOB (his x mark) WAN KUN,
LOTT (his x mark) TY EEN,
JAMES HADLEY,
WILLIAM H. LEWIS,
The leading men of Wrangell.

JOHN G. BRADY,
Governor of Alaska, Sitka.

AFOGNAK, ALASKA, *June 22, 1899.*

SIR: We, the natives and all the Russian population of Afognak, appeal to your excellency to help us to retain possession of the fish streams where we are dependent upon getting our winter's supply of food for ourselves and families. We can not get any chance of fishing in the streams, as the cannery fishermen of all the companies operating here have taken possession of the mouths of the rivers. They stretch a rope across the water, and as the rope vibrates from the force of the current, they frighten the fish. In the meantime they seine fish directly at the mouth of the stream.

We tried to remonstrate with them and they threatened to smash our skulls. We lay these facts before your excellency so that you may give us some assistance. We can not allow our families to starve, and if the canneries are allowed to carry away all our fish—the main food—we will be obliged to starve.

Hoping you will look kindly upon our petition,

We are, very respectfully, your obedient servants,

VASILI ALEXANDROFF,
RADION SHANGEN,
RADION X. MALUTIN,
Chiefs for the Afognak Population.

His excellency Hon. JOHN G. BRADY,
Governor of Alaska.

The Rev. J. H. Schœchert, superintendent of the Moravian Mission on the Nushagak River in Alaska, under date of April 22, 1899, writes to the mission board begging them to appeal to the Government to prohibit the placing of fish traps in the Alaskan rivers.

There is no objection to gill nets, which are from 6¼ to 6½ inches in the mesh, for these allow the small fish to pass through; but the fish traps kill all the small fish, and will result in the extermination of the food supply. As it is, many of the natives die of starvation each winter and they earnestly petition for the prohibition of these fish traps.

Many people have complained that the cannery people, especially the large concerns, conduct their business in a ruthless sort of way, bringing all their supplies and nearly all their labor—Chinamen, Italians, Portuguese, and Norwegians—aboard of large ships, which are sent to their different canneries, there to remain until the completion of the fishing season, about the last of September; that these men are contracted with not to receive their wages until their return to San Francisco. While all this may be true, the cannery men have no other recourse. When the fish are caught they must be canned without delay, and to do this men who are trained and used to it are necessary. They can not then undertake to deal with natives and others who have no training whatever, and who have no compunction in breaking a contract and leaving their work in the middle of the season.

Again, as set forth in last year's report, the canneries have had very little legal protection, for the reason that they are at great distances from settled communities, and the civil officers have had no independent means of transportation, and have been nearly powerless to give them any speedy and adequate protection. Again, it must not be lost sight of that these canneries have given to the world a vast amount of wholesome and nutritious food at a very moderate cost, which otherwise would have been completely wasted. There are probably between eleven and twelve millions of dollars invested in buildings, machinery, tackle, boats, and steam vessels for this industry. They ought to be here to stay, and to expect that year after year they could rely upon doing a profitable business. In view, then, of what has been given above this is surely the proper time for Congress to take this matter in hand. It would probably be best to limit the number of canneries and the catch in accordance with the capacity of each stream, and put the hatchery business wholly in the hands of the United States Fish Commission, and tax each cannery for their support in proportion to the amount of its pack. The Fish Commission would no doubt gladly take up the work, and would have the warm and hearty support of all the cannery people.

All the laws bearing on this industry should be both plain and susceptible of but one interpretation. And the officers and means for enforcing the same should be ample. The distances are such as to require a good, well-equipped steam vessel, so that the officers shall be entirely independent. Heretofore they have often been obliged to accept transportation and entertainment from the cannery people themselves. It does seem that in the light gained here in Alaska in the last ten years, and in view of what has been brought about in British territory and elsewhere, that a law should be framed that would give protection to the capital now invested and still give justice to the natives, who from time immemorial have regarded the salmon as their staple food, and at the same time keep the streams

well stocked with fish by the continual use of hatcheries, which should be under the sole control of the United States Fish Commission.

Mr. John C. Calbreth, of Fort Wrangell, has been conducting a hatchery for a number of years, but says that under the existing laws he has no adequate protection. As yet the streams which he has stocked have not shown any great signs of increase, but he is sanguine that in the near future he can, if unmolested, reap an ample reward for his labor. He has communicated with this office, and what he has to say can be found as an appendix to this report.

The matter of the hatcheries is really the vital point of the whole industry and should not be left to uncertain and desultory propagation. It is therefore urged that the Government put the matter wholly in the hands of the Fish Commission. In doing so, however, it should be careful to do ample justice to Mr. Calbreth, the Alaska Packers' Association, and any others who have been to the expense of starting hatcheries.

The rivalry is great among the canneries, in fact so great that at times one cannery will catch and destroy tens of thousands of fish which they are unable to can rather than to allow the rival cannery's fishermen to catch them.

It is noticeable that around the location of the canneries there are men who are intermarrying with the natives and creoles, and some who are bringing their families from below are settling and making permanent improvements. The shareholders and managers of these large institutions, while they are keen and shrewd business men, are nevertheless large hearted and patriotic. We feel like earnestly pleading with them on behalf of the native Alaskan, that they will make an endeavor to train these natives to do their work. The sea otter is doomed, and to-day there are a large number of Aleuts who are practically helpless. These people have good natural gifts; many of them are ingenious. We know that they have intemperate habits; at present no superintendent could be assured of putting up a pack entirely by their labor. Yet in time, under the management of local superintendence, they could be taught to make the cans in the winter or early spring and very largely take the place of the Chinese. To this end they should be sustained by local magistrates with a firm determination to keep down and punish intemperance. Mr. Wadleigh, the superintendent for the North Pacific Packers' Association at Klawock, Prince of Wales Island, had practically solved this problem of how to work the natives. He succeeded in bringing them to a high state of efficiency by letting the work to them by the piece or case. Last year, however, they gave themselves up to drunkenness, so that this year he was compelled to import Chinese and Italians to do the work, with a consequent loss of twelve or fifteen thousand dollars to the natives of that community.

It is to be hoped that at the coming session Congress will be liberal in giving every community the proper legal protection that it should have, and if such protection is given it seems that cannery superintendents and managers should be instructed to train and employ natives to do their work. If this could be brought about it would be of great advantage to the cannerymen, as they would then have their laborers permanently near their works. It is becoming more difficult each year to obtain gangs of Chinamen, and if the natives were brought into more harmonious relation with the cannery people there would doubtless be much less complaint on their part about the tak-

ing of fish, for a great many of the fish which the natives are in the habit of taking are not wanted by the canneries.

Those who wish to obtain more of the detail concerning the canneries should obtain the reports of Mr. Howard M. Kuchin, special agent for the protection of Alaska salmon fisheries under the Treasury Department.

Cod.—The cod will always be our standby. We probably have the grandest banks in the world. The United States Fish Commission has done some work with the *Albatross*, under the command of Captains Tanner and Moser, in determining the number and extent of these banks. It is a safe calculation that we have not less than 125,000 square miles of cod fishing in connection with the Alaska coast. Here is an immense wealth simply waiting for development. Some vessels from San Francisco have been fishing at the Shumagin Islands, Bering Sea, Okhotsk Sea. They return to their home port every season with good cargoes. It is noticeable that very little loss of life has attended the Alaska cod fishing. This is entirely different from the experience on the Atlantic coast. In the past few years some firms from Puget Sound have entered into this business and have been successful. It hardly seems possible to exhaust this species by overfishing. There are other kinds of fish which run in these waters, but as yet they have not been taken hold of for commercial purposes.

The eulachon run at Chilcat, Yakutat, and Cook Inlet and are very highly prized by the natives. Oil of this fish in southeastern Alaska, across from Naas River, is valued at $3.50 for a 5-gallon can. In the neighborhood of Atka and Attu, and doubtless near the intervening islands of the Aleutian chain, is a fish which is called the Atka or Attu mackerel. This is not handled for the market, but the Alaska Commercial Company puts up a certain quantity for the use of their employees and their immediate circle of friends. The fish is rich and fat, delicate in flavor—somewhat like that of an Eastern mackerel—and highly prized for a breakfast dish. The kinds known as the black cod and the red snapper are here, but they are not taken for the market.

Whales.—We have whales here, too, of various kinds, and sometimes they have been caught and tied by a hawser to a tree; that was once done at Klawack, Prince of Wales Island, when one of these huge leviathans came in to scratch off the barnacles on the rocks and forgetting that tide waited for no whale was left high and dry upon the strand.

The natives on St. Lawrence Island, and along the coast to Point Barrow, almost every year succeed in taking a few of these animals. They sell the bones and keep the carcass for food.

Navigators for several years have noticed numbers of the long finbacked or killer whales in Bering Sea; they usually go in schools, and the natives fear them. They have no commercial value and are not sought by hunters, but if we intend to protect the fur seal we ought to know that this fellow is his enemy and relishes a fur seal pup as much as an Aleut does. It would be well to put a good bounty on the head of each and thus encourage the killing of them, though the steam whaling companies now make their principal catch in the Arctic Ocean to the north and east of Point Barrow.

Herring.—The Alaska Oil and Guano Company, at Killisnoo, Chatham Straits, is in a prosperous condition. They have a very complete plant and have enlarged it very much during the past year. They

devote themselves almost entirely to the taking of herring for the purpose of oil and fertilizing material. They have a barrel factory for manufacturing the barrels for the oil and half barrels for salted herring. Their machinery for drying and handling the fertilizer is quite complete. After many years of steady effort they have succeeded in creating and building up a demand for all this material that they can produce, for it has been well tested and found valuable in the sugar plantations of Hawaiian Islands. This past season a large four-masted vessel took aboard at their docks 17,000 sacks and sailed directly for Honolulu. This company packs a thousand or two half-barrels of salt herring, which are carefully selected.

Mr. Buschman has a saltery at Wrangell Narrows, and is also putting up salt herring in barrels and half-barrels for shipment to the South. The herring must surely be abundant, for big fishes, porpoises, whales, and man all seem to agree that they are proper food. The natives in the spring of the year, when the herring are spawning, cut the boughs of the hemlock and anchor them at low tide on the spawning ground; in a short time the boughs are fairly incrusted with spawn; they are removed and hung up on fences, trees, and lines to dry. Among the natives these herring eggs are highly prized and are quite an article of commerce in the early spring. They either eat them raw or rub them in a basin of water between their hands to free them from the hemlock leaves and twigs, and then stew them in water and serve them with seal or oolakan oil.

Halibut.—Halibut abound in many places along the coast. They are now being taken from the waters of southeastern Alaska and packed in ice and shipped by steamer to Seattle, where they are distributed to various places in the States by rail. At some places the problem is a very simple one, as near Petersburg, at the mouth of Wrangell Narrows, where floating ice from the glacier is obtained right on the fishing ground. Hardly anything is done in curing the halibut, excepting that the natives cut it in thin strips and sun dry it for their own food.

This office has no means of ascertaining the quantity of fresh fish which was shipped the past year, but we are well aware that it amounts to many tons.

FURS.

Up to the time of the transfer and many years afterwards the fur industry was almost the only industry that was considered remunerative or received attention. Where the prospector or miner advances the wild animals give way. The old fur companies knew this well and were loath to take up other occupations. It is not possible to give definite numbers of any of the kinds of furs except the fur-seal skins and the sea otter. This latter animal is disappearing very rapidly. The catch for the whole season will probably not amount to over 125 skins. The hunting parties of the Aleuts have had very little reward for their many weeks of hunting, some parties not receiving more than $10 or $15 for the season's catch even at the very highest price now given for these pelts. As the natives realize so little from these animals, it would probably be well that the hunting of them be prohibited for ten or fifteen years to save them from becoming extinct and see if they would multiply. There are a great many bears in Alaska, brown, black, and polar, and the total number taken each year must be considerable. The beavers' homes are invaded more and more. This

interesting animal, too, will soon become extinct unless he is allowed to be unmolested in some large preserves. These pelts have a special value to the Eskimos, who trade them to the natives on the Siberian side. Minks abound and should hold their own for a long time. These animals of late years have had a chance to multiply because the natives have had remunerative employment in the fisheries and mines, and on account of the prevailing low cost of skins have not tried to hunt them, but now as the prices are high they will doubtless hunt them diligently.

The lynx and wolverine are taken. The skins of the former are prized very highly by the Eskimos and probably the best market is found among these people. They trim their parkas with them, and they are really handsome and durable furs for that purpose. The martens are becoming fewer year by year. The little squirrels in the northern country are very abundant, and their skins are very serviceable for robes and linings. We have the red, white, blue, cross, and black foxes. No effort has been made by the Americans to propagate any but the blue and black species. The efforts with the black fox were not successful, the male appearing to be vicious, and he does not hesitate to devour the young kits when he has an opportunity to do so. The blue fox, however, takes more kindly to domesticity, and the progress made so far with them is very gratifying. Maj. E. W. C. Clark, the Government agent on St. George Island, said that 418 skins had been taken—341 first class, 59 second class, and 18 white. The foxes there are fed from seal meat which is preserved in a kit at the killing season. The animals are so easily handled that they can deal with them almost like cats or dogs.

THE FUR SEAL.

There is not much that can be said on this subject in addition to what has been already reported by various Government officers, who have been commissioned to investigate this matter. Another year only gives additional weight and force to their testimony. The herds are decreasing. Pelagic seal hunters are still active, as numbers of pups on some of the rookeries on St. George Island were found starved to death by the failure of their mothers returning to nourish them. This all happens even while the regulations in regard to the 60-mile limit are enforced by our revenue cutters and three British war vessels. It would seem, therefore, that if we wish to preserve these valuable and interesting animals upon these islands the United States has but one policy left to pursue. We should maintain stoutly that we have a property right in the seal, and to make this plainer and more certain we should proceed to put a brand with the letters U. S., 4 inches long and a half or three-quarters of an inch wide, upon the back of every female. If one of these animals so branded is killed by the pelagic sealer, his skin will bring but a small price in the fur market for it is spoiled for the furrier's purposes.

As about 80 per cent of the animals taken in the sea are females, the sealers' catch for the year would not be profitable, and for that reason sealing would soon cease.

It is urged, therefore, that the Department give this matter its careful consideration and be ready in the coming season to send a sufficient force of men, who are experts in the business, and furnish them with the most recent electrical appliances for branding, which the stockmen have found to work so well upon our Western plains. Numbers of

these animals have been branded heretofore, but with the most clumsy apparatus and by men who were not skilled in the business. The brands heal just as they do on land animals.

The sentiment raised about its being a cruelty should not deter us, for the real cruelty comes in allowing the killing and wounding and starvation to go on as it has been doing for some years. This seems to be our only and last resort in endeavoring to preserve these valuable rookeries.

The male animals of proper age were killed almost to the last one—2,520 on St. George Island and something over 14,000 on St. Paul.

The revenue cutter *McCulloch* anchored off St. George on September 4, and the governor and judge, together with other members of his court, went ashore. Maj. E. W. Clark, the United States agent, received us and conducted us over the ground.

The census of June 30 shows a total of 99 natives and 11 not natives. Of the 99, there are 49 males and 50 females; also children under 16, 24 males and 23 females.

Two deaths were reported during the year.

The lowest temperature for the winter was zero for part of the day. The temperature for most of the winter was 18° to 20°+.

They had an epidemic during the winter, but no fatalities.

The North American Commercial Company has faithfully performed the different things which are required by its contract with the Government. The natives are well housed, and the houses are kept in good condition; the school is kept running; the widows and orphans are looked after.

It is a serious problem to know how to deal with these native people on the Pribilof Islands. The Government is now appropriating $19,500 annually toward their maintenance. When the seal herds were at their best and the company was allowed to take 100,000 skins, these people were probably in better circumstances than any similar number of people, anywhere, in the same station of life, many of them keeping bank accounts in San Francisco.

If the Government could come to satisfactory terms with the North American Commercial Company, the lessee of these islands, it would be best to stop the killing of seals entirely, and to transport these communities to Kadiak Island or some other point, give them sufficient means to make a good start, and require them then to do for themselves, as all other natives in Alaska are doing.

It is believed, therefore, by persistently branding and by the cessation of killing for at least ten years, that the animals would increase to their former great numbers on the various rookeries, and thereafter this useful and profitable business could be carried on.

The island of St. Paul could not be visited on account of our inability to make a landing from the *McCulloch*.

TIMBER.

In southeastern Alaska the islands and main coast are covered with dense forests of spruce, hemlock, and Sitka cedar, and in the extreme southeastern part the red cedar is found in abundance.

There are forests of coniferæ along the rivers of the interior, the Yukon, Tanane, and Koyukuk, the trees on the latter river attaining the size of 2 feet in diameter.

At the present time there are twelve mills in operation in southeastern Alaska. These are nearly all of very small capacity, and all

the lumber which is manufactured is for use in the Territory, none being shipped out. The prices charged to the consumer in Sitka are $13 per thousand rough lumber, $20 per thousand for flooring and rustic, $25 per thousand for selected boat lumber, and $50 per thousand for clear cedar. Most of the lumber and timbers which have been used in the great mining enterprises and in the rapid building up of Dyea and Skagway and the White Pass Railway have been imported from Puget Sound.

Nearly all the timber, so far, which has been taken in southeastern Alaska has been put in the water by hand loggers and has hardly ever been over a distance of 200 or 300 feet from salt water.

The chlorination works in connection with the Treadwell mines have been shut down; consequently the spruce which they used for the roasting process is no longer cut into cordwood.

The Government should give the citizens an opportunity to purchase this timber at a very small cost. The amount of waste that goes on in these parts is tremendous, a great many of the trees have attained their full growth and have blown down and left to decay. It is the part of true forestry to see that these trees are removed and utilized. The Government could well afford to encourage it. The forests in southeastern Alaska are unlike those in any other part of the United States unless it is in western Washington. The great amount of rain falling upon the ground heavily carpeted with moss, which holds water like a sponge, preserves the timber from destruction by fire. It is only in a very few places and in an extraordinarily dry season, and where the timber seems to grow upon the bare rocks, that the fire has had any chance to spread. Young timber springs up and grows very rapidly. The spot where the native village was located upon Halleck Island when the Russians made their first settlement near the present site of Sitka, is now covered with a growth of spruce timber which can be cut and manufactured into merchantable lumber. In the interior of Alaska it is different. The summers there are hot and dry, and fire has a greater chance to spread. The limbs of the trees almost touch the ground and they are full of pitch and for the most are very small. However, small as it is, it is a blessing to the prospector and settler. The Government should, as it has done, post notices about fire and prosecute those who have willfully violated the rules and regulations of the Department for the protection of timber against fire.

During the present year many men who went prospecting upon the Koyukuk, Tanana, and other branches of the Yukon, and who were reduced to their last dollar, found that they could maintain themselves by cutting cord wood to supply steamboats. They have obtained $7 and $8 per cord, and many were offering their wood at $5 per cord on the last trips of the steamers. Considering what they have to pay for provisions, men would have to work very hard to thus obtain another grub stake or earn enough to pay their passage out of the country. They have cut this wood without any molestation by Government officials, except in one or two instances, and it is good policy to allow them to do so. Much of the timber, too, which they have cut is in places where fire has swept through and the trees have all been killed. It is better to use it on steamboats than to let it rot on the ground. The report of Colonel May, inspector from the Interior Department, who was ordered to proceed down the Yukon and investigate the timber question, will, no doubt, be very full and instructive on this matter. However, the timber in southeastern Alaska

remains as a very great resource to be developed, and in the future, when Alaska has attained a large commerce with Siberia, Japan, and China, it will be fully utilized and will give employment to many thousands of people in putting it into marketable shape.

AGRICULTURE.

Nothing should concern any of the people of Alaska so much as its agricultural interests. From the purchase until now, the impression that the general public has had is that, agriculturally, Alaska does not amount to much, and those who have persistently cried up its possibilities in this direction have been derided and looked upon as being cranky. It is true that we have rain and snow, and glaciers and polar bears, but all when and where they belong and at the proper season; but it is also true that we have warm ocean currents along the coast, and that we have a climate in the southeastern part that is astonishingly mild and equable. Those who wish sincerely to investigate this subject will be greatly aided and rewarded by consulting Rand, McNally & Co.'s physical map of North America. This map is gotten up with great pains and embodies the latest information from authentic sources. You will there find the line which traces the northern limit of cereals, after passing Lake Winnipeg, runs sharply to the north and west and so continues, crossing the Porcupine River above Fort Yukon and thence along the north side of the Yukon River until it comes out into Norton Sound above St. Michael. It will be noticed also that the isotherm for January, which passes through Wilmington and Baltimore, Indianapolis and Omaha, turns sharply to the north and west and comes out upon Prince of Wales Island in the southeastern part of Alaska. The isotherm for January runs through Alaska north of the Mount St. Elias range and comes out about St. Michael and runs north of St. Lawrence Island. It will be noticed also in latitude 50° the North Pacific current makes a great sweep toward the Alexander Archipelago and continues its course to Kodiak and Aleutian islands.

Therefore, so far as heat and cold are concerned it ought not to be thought impossible for things to grow in Alaska. The Agricultural Department has taken the matter up and in 1897 obtained an appropriation of $5,000 to make investigations and to report to Congress. The commissioners visited the Territory and gathered a great deal of desultory information from those who were making efforts in various places and sent back to the Department all kinds of specimens, the natural and cultivated products which they found growing here. The information thus obtained abundantly justified the Secretary in asking for another appropriation for further investigation, and last year the beginning of experimental work was made. Oats, barley, flax, potatoes, clover, and many kinds of vegetables were planted and brought to full maturity. The showing which was made was gratifying and the appropriation was continued and increased to carry on more thorough experiments. The results for this season's efforts were most gratifying to friends of agriculture and will surely astonish and convince the "doubting Thomases."

Oats, wheat, rye, a number of varieties of barley and buckwheat, cabbage, cauliflower, potatoes, turnips, ruta-bagas, thyme, sage, horse-radish, rhubarb, carrots, beets, parsnips, lettuce, radish, peas, horse beans, onions, celery, etc., were planted and nearly every one were brought to perfection. The cereals above mentioned all filled

out with plump grain and came to full maturity about the last of September. They were planted the last of April. They grow with rank straw. The danger in trying to raise a crop would be the falling or lodging of the same when they would come to blossom. Good garden truck was successfully grown at Eagle City, upon the Yukon, and some of us, while passing through, enjoyed a lunch at Rev. Mr. Kirk's, where were served fresh lettuce, peas, radishes, turnips, onions, and huckleberry pie made from berries gathered in the neighborhood. This was the first week in August.

While at Circle City we had lettuce, radishes, and spinach, which grows wild abundantly. Commissioner Crane at this place had a little plot of oats in front of the North American Trading and Transportation Company's store. These were in blossom on the 8th of August, and would no doubt ripen by the middle of September; at any rate they would make fodder or ensilage. Farther down the river, at Holy Cross Mission, one large cauliflower and two good heads of cabbage were sent aboard, a present to the captain of the steamboat from the mission. We were sorry that the captain could not stop long enough to allow his passengers to make a visit to that interesting mission. We could see from the deck of the steamer large gardens in fine condition. The father superior informed us that last year they raised 300 bushels of potatoes for their own use.

The workers at this mission deserve credit for these satisfactory demonstrations of what can be produced from the soil in that part of Alaska. They also, for several years, have had success in keeping cows. These workers are pioneers in the Yukon Valley. They are self-denying and depending almost wholly upon their own efforts, and all good Romanists who have the missionary spirit in them need not hesitate in helping them to expand and obtain better buildings and means to work with. The Swedish Evangelical missionaries at Unalacleet have been fairly successful in gardening at that place for several years. They have had the hardy vegetables, such as carrots, turnips, and radishes, and most years have been fairly successful with potatoes. They keep several cows, and there is a great abundance of grass all around there. Their cattle were very fat in August. They had an abundance of rich milk.

Farther west on the coast line, at Golofnin Bay, Captain Dexter has been settled for several years. His efforts at gardening have been fairly successful also. In both latter cases, however, the gardens were neglected on account of the great excitement over the gold diggings at Cape Nome. A few vegetables are grown on St. George Island. The grass here is abundant, as it is also upon St. Paul Island. The North American Commercial Company at Dutch Harbor had a very creditable garden. Mr. Gray, of the Alaska Commercial Company; and others of the citizens of Unalaska had fair vegetable gardens. We saw a number of cows grazing around the town, all in fine condition. Fresh milk was advertised at 10 cents per quart. Dr. Newhall at the Jessie Lee Home had just built a silo and had one full of grass for winter forage for his cows. Coming east to Unga on the southern coast, we found that a number of patches of ground had been planted for gardens and produced moderately well. We saw a number of cows and young cattle around the town, and there was an abundance of pasturage. This was an unusually dry season for Kadiak and the neighboring islands. They have quite a number of nice sleek cattle. We saw here quantities of fine vegetables—celery,

cauliflower, onions, ruta-bagas, and white turnips. The Russian priest had planted some wheat and oats. These grew and filled out with heavy heads and came to perfect maturity. Mr. Feeny, an old resident of those parts, had about forty head of cattle. We saw an abundance of pasturage everywhere, and all who had cattle had sufficient well-cured hay for the winter. At the Baptist Mission on Wood Island, where they have a horse and several cows, Rev. Mr. Coe informed us that the silo which he built last year was satisfactory, and that they were again filling for the coming year. Here, too, they had a good garden. The garden which has been attempted upon the Kenai peninsula is very successful. Vegetables sent to Sitka recently from Resurrection Bay, namely, cauliflower, turnips, potatoes, carrots, and parsnips, would easily take the red ribbon at any county fair.

Missionaries at Yakutat, near Mount St. Elias, have had cattle for the last eight years. They are always in good condition. In the winter they are never fed upon anything but ensilage. Their silo is a very simple affair. Indeed, it is more like a large pen than anything else, only it is fairly tight on the sides. The sides are open near the top, which is covered with plain boards for a roof. They cut the large and coarse mullus and bind it into bundles and pack it tightly, and then over this they put on a cover of sand and gravel 6 or 8 inches deep and several tons of stone. Their testimony is that this makes a better ensilage and stock do better on it than on the red top. Last year, imitating the successful example of this Yakutat missionary, a man in Sitka built a silo and put up about 30 tons of this same kind of grass, and wintered a colt and two cows; these cows had, in addition, middlings given to them for the sake of getting richer milk.

Perhaps the most successful effort in raising what might be termed a crop was by Mr. Baker, at Hood Bay, Chatham Straits, where he has a ranch of over 60 acres. He raises quite a crop of turnips, potatoes, beets, carrots, etc., for the market. Those who have eaten them are well satisfied with their quality when compared with the best imported vegetables. Mr. Baker's greatest trouble is that he is not in proximity to the ready market. The gardeners in the neighborhood of Juneau have been well rewarded. One man has cleared more than $2,000 by raising vegetables and cultivating flowers in his small garden. Many of us who have been brought up upon farms in Ohio, Indiana, and other neighboring States, who know what it is to go into a deadening and clear up a new farm, will have no doubt as to what can be accomplished by similar energy put forth here in Alaska.

Putting aside all possibilities of raising cereals, there is one thing about which there is no doubt—that is, that grass can be raised throughout the whole of Alaska which is south of the Yukon River; the moisture is here to make it grow, and that it does right luxuriantly. It is certainly nutritious, for cattle become very fat and the meat has a delicate flavor. The fat on the back of the deer and caribou is from 1 to 3 inches thick. There can be hardly any doubt in the minds of stockmen who have given any attention to this subject that Alaska is bound to become a great stock country. Those who have crossed from Valdes and Cooks Inlet to the Yukon last season and this tell us that there are vast meadows or savannas which are waving with beautiful grass. Colonel Ray is very sanguine on this subject. He has had large experience on the whole Western frontier, and he is competent to speak on such matters, and thinks that a very

large part of Alaska surpasses anything west of eastern Nebraska and east of the western chain of mountains. The Yukon Valley and the Tanana region will, no doubt, be more reliable for cereal crops than the coast line of Alaska. In the former the fall of snow in the winter is not so heavy. It melts earlier in the spring. There is but little rain during the summer. The heat during the long days is intense and the plants have many hours of light in each day to force their growth; they are always assured of sufficient moisture by the thawing of the earth beneath. It is noticed that all plants have a forced growth and come to maturity very rapidly. For this reason it is altogether probable that in the near future the railroads and river steamers of Alaska will be carrying cargoes of the best barley and oats. Surely the Government can make no mistake in making reasonable appropriation to enable the Agricultural Department to send its forerunners and investigators in advance into these promising regions to obtain definite information, that those who are longing to come and take hold of these advantages may do so with reasonable assurance and confidence.

MINERALS.

GOLD.

One is embarrassed when he tries to set forth an accurate and truthful statement in regard to the production of this mineral at the present time, both from the quartz and placer mines and as to the promises of its production in the immediate future. It is only here and there that we can get reliable reports, and whatever is herein set forth must be accepted as near the truth as is possible to obtain. The production from placers in southeastern Alaska is carried on upon the Porcupine and neighboring streams near the boundary on what is known as the Dalton Trail leading up from Pyramid Harbor, situated upon Lynn Canal. We have no means of knowing the product of this camp, but from what is reported it must be already amounting to several thousand dollars. The gold is coarse and assays well. Hydraulic mining has been carried on in Silver Bow Basin, back of Juneau. This plant has been in operation for several years, and parties this year have taken hold of the next lower basin of Gold Creek and are proceeding to run tunnels and to develop a very large hydraulic plant. They have reasonable prospects that this enterprise will be profitable. We jump to the Yukon Valley and take Eagle City as the center, and we find that Forty-mile Creek and that region has been very promising this year toward the very close of this season, and the rich clean-up of many of the claims excited great interest among many of the old timers who have been successful upon the Klondike, and some of them hurried down to purchase interests, for which they paid very large sums. There are several thousands of square miles in that region which can be put down as good placer-mining territory; the great stampede to Dawson left it almost deserted for two years, but it is now coming to the front, and conservative estimate of that camp can be placed at $750,000. As we proceed down the river we find that Circle City is the headquarters of the next mining section, Birch Creek and its tributaries on the south side of the Yukon. There is considerable prospecting and some of the claims have turned out well; the product is estimated at $450,000. Down the

river we came to Rampart City, which is the headquarters for Manook, Hoosier, and other creeks. This is one of the newest of the camps, and considering the number of men and efforts put forth the returns are very favorable. The estimate for the output is $250,000. Last year the Koyukuk River excited great attention, and a great many companies outfitted at a very considerable expense building stern-wheelers, taking pumps and dredgers and all necessary tools, a large supply of provisions, and proceeded to ascend the river. They found colors on the bars as they went up, and believed that if they could get to the sources they would find coarse gold. They scattered along the various tributaries, built their winter quarters, and proceeded to prospect. Their greatest difficulty in attempting to reach bed rock at any point was with the water. They tried in all ways to overcome it, but could not. Many became sick with scurvy and suffered intensely; some, however, pushed north to the head tributaries of this great river and found good prospects. One party of Swedes, upon a creek called Myrtle Creek, had succeeded in whipsawing lumber and erecting a set of sluice boxes and had cleaned up several hundred dollars in coarse gold in a short time. About an ounce of this gold was exhibited by Howard Keif, of Haverhill, Mass., who sold the Swedes a portion of his outfit before going out. The majority of the Koyukuk prospectors left the river sick and discouraged, but nearly all of them believe that gold was in the country and that it would yet be found. What has just been said above concerning these people who went to the Koyukuk may be said of those who went to Kotzebue Sound and endeavored to prospect the streams which empty there. It is pitiable to listen to the stories of their suffering. Many fell by the way. Scurvy was the scourge, and the cause of this disease does not seem to be well understood. Men had good outfits of all kinds of food that can be taken into a camp, yet many of them took the disease and died.

Mr. Sperry, an elderly gentleman from Connecticut, wintered there, and crossed over in the spring to the Koyukuk River. He was met at Circle City. He thinks the reason why men take the scurvy is that they break up their regular habits. They lie in bed during the cold weather and do not take their meals regularly, and are not careful about cooking their food properly. He said that he was not troubled in the slightest. He was careful to have regular hours for meals and to take exercise. It may be that this tendency to hibernate during the dark, cold days in that Arctic region is the main cause of the scurvy. The natives are not troubled with it. They have to get out and exert themselves to supply their wants, and of course they always have a fresh diet of fish and flesh.

Last year placer gold was found upon Fish River and its tributaries which empty into Golofnin Bay. The mining district was organized and a recorder elected. Some claims were worked for a short period before the winter set in. The amount of the output can not be ascertained.

Cape Nome.—In July last year a rumor reached the Swedish Mission on Golofnin Bay that gold had been found at Sinrock, which is about 25 miles from Cape Nome, on the coast to the north. A party, consisting of N. O. Hultberg, John Brinterson, and some others, started for the place where gold had been reported to have been found. They were storm bound and went ashore to camp near the mouth of the stream which is known as the Snake River. On the following day they crossed over the tundra to Anvil Creek, which is a tributary of

Snake River. Here they found a color of coarse gold. Brinterson and Hultberg wanted to stay and investigate, but the others would not consent, and so they went to Sinrock. They were not successful at this place, and on their way back they did not stop at Snake River, but pushed on to Golofnin Bay. Hultberg, however, was persistent, and wanted to investigate Anvil Creek, on account of the prospect which they got while storm bound. So a party was made up of E. O. Linblom, John Brinterson, and Jafet Linderberg. They left Golofnin Bay September 11 and soon reached Anvil. They were there six days and made locations upon Anvil, Glacier, Rock, and Dry creeks, and Snow Gulch, tributary to Glacier.

Anvil was named by Lindberg on account of a peculiarly shaped bowlder on the top of the mountain, which slopes down to the creek; it has the appearance of a huge anvil. They made their last location on September 27 and returned to Golofnin Bay. Here another party was formed, and in about eight days after loading the mission schooner started out, it being about the middle of October. John Brinterson, J. Linderberg, E. O. Linblom, J. W. Price, Dr. Kittleson, and Johan Tornenson held a meeting on the 18th of October, organizing the Cape Nome mining district, comprising an area 25 miles square. The easternmost corner was to be at Cape Nome. Dr. Kittleson was elected recorder. They washed out about $1,700, $900 of which was from Snow Gulch, the rest from Nos. 7 and 8 on Anvil; only five days were devoted to washing; the rest of the time was spent in marking claims. They left Cape Nome November 7 in a small boat and only proceeded a short distance along the shore, and then went with dog teams to Golofnin Bay and met Mr. Anderson, the missionary, with a reindeer team, who returned with them. The Lyng brothers and Messrs. Ingelstad and Dexter learned of the discovery. They hurried forward to locate claims, and they also made locations of town lots, one of the Lyngs driving the first stake. The news spread from Golofnin Bay and Council City district to St. Michael, and from these places there was a stampede to secure locations. All locations are 320 feet by 660 feet. Nearly all not only located for themselves, but also for their friends by power of attorney, and nowhere has the power of attorney been so abused as at Cape Nome. Mr. Sam. C. Dunham, the superintendent of census for north Alaska, was there in August, and in overhauling the recorder's book he found that the records of the district recorder of the Cape Nome mining district disclosed that on July 10, 1899, there were 232 powers of attorney recorded. The five creators of the district hold 31 powers of attorney among them, one holding 12. Fourteen other persons hold a total of 100, or an average of 7, the lowest number held by any one of the fourteen being 4, and the highest 11. The five original locators located, in their own names, 58 claims, the lowest number located by any one of them being 4, and the highest 30. Fourteen persons, who hold the total of 100 powers of attorney, located for themselves 111 claims, an average of 8; the lowest number located by any one of them being 4, and the highest 14. It would require too much time and space to show the number of locations by power of attorney made by the nineteen persons referred to. Four of them made 111 such locations, the lowest number being 16 and the highest 52. Thirty-eight persons located 361 claims in the Nome district, or an average of 9. Here we find 7,200 acres located by 38 persons for themselves, and for their friends by power of attorney. The two thousand or

more others who soon got upon the ground found little show to make locations; consequently there was a good deal of bitter complaint. Some of the original discoverers and locaters had not even declared their intention to become citizens at the time of their location. They immediately endeavored to remedy this by appearing before Commissioner Shepherd at St. Michael, who issued to them their first papers and took his fee therefor, an act which was not legal. Nearly all the miners are in agreement that the right to make mining locations by power of attorney be done away with, and that the size of the placer location be reduced to 300 feet, and that the mining district should not be more than 5 miles, and that but one location be allowed to each person in such district, whether there be one stream or many in it. As more miners reached the shore they began to talk over the situation and gathered in squads. Much enmity began to brew, which, no doubt, would have ended in serious trouble if another important discovery had not been made. One of the soldiers who were stationed there went to the beach and tried a pan of sand, and to his astonishment found richer colors and showed it to some idlers who were in the store and who would not believe the soldier's story. He showed them the place where he had obtained the colors. Upon their making another trial much better results were obtained. This is said to have been the starter of the beach diggings. There were hundreds of men camped along the beach who had come there sick, sad, and sore from the Kotzebue and Koyukuk and places along the Yukon, and were hoping that the Government would somehow take them out of the country. Some parties had sold their stern-wheel steamers and outfits for a very small fraction of what they had cost them. When the news was announced that under their very feet there was a layer, and in some places layers, of ruby sand which was rich with gold, which they so much coveted and for which they had risked and endured so much, they sprang to work with alacrity, and, as if by magic, there could be seen a string of tents for 15 miles along the beach, in front of which were men digging down through the ruby streaks and shaking their rockers. How glad they were when they made their first clean up and found that the yellow metal was there indeed. It was a godsend to them and nearly all so regarded it. There was no quarreling or contention among the men about the claims. Each man when he came with his rocker would mark out a piece of ground 15 or 20 feet square, and by mutual consent that was his claim; and so they went on along the shore, some finding richer spots than others. It is estimated that there were about fifteen hundred men at work, and a conservative estimate is that each man averages $20 a day. It was estimated that the product of the beach at the end of September would amount to $1,000,000. Copperplates were in great demand by those who had rockers; in fact, the demand could not be supplied. One man was seen with a silver plate made of 64 silver dollars held in place by copper tacks, a very good method by which the 16 to 1 can be worked out. This wonderful discovery of rich sands upon the beach between the high and low watermark brings before us an interesting and important question.

Congress, in section 2 in the act approved May 14, 1898, lays down the following:

Provided, That nothing in this act contained shall be construed as impairing in any degree the title of any State that may hereafter be erected out of said district, or any part thereof, to tide lands and beds of any of its navigable waters, or the right of such State to regulate the use thereof, nor the right of the United States

to resume possession of such lands, it being declared that all such rights shall continue to be held by the United States in trust for the people of any State or States which may hereafter be erected out of said district. The term "navigable water," as herein used, shall be held to include all tidal waters up to the line of ordinary high tide and all nontidal waters navigable in fact up to the line of ordinary high-water mark.

This same doctrine is laid down in the decision of the Supreme Court in U. S., 152, Shively *v.* Bowlby. So it is plain that the miner can have no right to mine the beach under any mining law of the United States.

Now the question is, What shall be done? There is no telling how many miles the seashore may be profitably worked either by rockers or machinery. It is probable that the same shore can be mined profitably for years, as the surf does its mighty work in changing and driving the sands from one position to another. We are all concerned to see that the gold is taken out and put in circulation, and the beach will still be none the worse for other purposes; but there should be rules and regulations to give a man encouragement and a certainty of tenure as to the amount which one applicant could hold and the length of time. Shores that can not be worked profitably by miners with rockers might be made profitable with proper machinery. Such enterprises would want, naturally, a good space of ground. In view of these difficulties, it is suggested, as a possible solution, that the Secretary of the Interior be authorized to lease the right to applicants in their order of filing at a nominal sum per hundred feet measured along the ordinary high-tide mark. The amount which any person or corporation so applying shall have, more than 100 feet, shall rest with the discretion of the Secretary of the Interior. The creek claims which were being worked upon Anvil, Glacier, and Snow Gulch were proving very rich. No. 1, below Discovery, on Anvil, at the end of September will have taken out over $100,000 from a small piece of ground.

There was a scarcity of water at Snow Gulch the latter part of August, and upon one claim where they could run but four hours a day with water which had accumulated during the rest of the day one nugget was exhibited which was valued at $312, at $16 per ounce, and another nugget at $250. It is believed that the output for the creek claims which were being worked will reach $500,000, and the whole camp will produce this year $1,500,000. If one wishes to get an idea of tundra let him imagine a vast area covered with immense sponges packed in tightly together about 6 or 7 inches deep, and scattered over this other sponges of about the same size stuck in with stout twigs 3 to 5 inches high, the bottom layer soaked full of water. Then with a pair of mukluks on his feet and a pack on his back let him travel and seek his fortune, which lies hidden on some stream which runs through the range of low mountains far beyond. It becomes extremely tiresome to travel over this hummocky, oozy tundra. The ground thaws to a depth of 16 or 18 inches. Gum boots are too heavy for traveling over it. The best covering for the feet is the native mukluk, a well-made boot of the sea lion and hair seal skins. The soles, made of the heavier skins, are sewed neatly with sinew, and are provided with loops and thongs to secure them well to the feet and legs. They are made large enough for wearing several pairs of socks. A layer of straight dry hay or straw in the bottom is a protection to the foot. These boots were selling in August for about $4 per pair. A pack train was at work carrying goods from Anvil City to the creek. The

price was 15 cents per pound to nearest claims and 20 cents per pound to claims above No. 5. It is about 6 miles to No. 1 on Anvil. Coal oil was selling at $8 per case of 10 gallons. Good Puget Sound lumber was selling at $125 per M. Prices go up and down rapidly according to demand and supply. One man who was fortunate enough to have a lot of sheep easily sold his mutton at $1 per pound. Flour, beans, sugar, bacon, and all the staple groceries were reasonable in price. Those who contemplate a journey to Cape Nome should ponder the question well before starting. To go there from the Sound by the inside route to Skagway over the White Pass Railroad to Lake Bennett, and thence by river steamboats to St. Michael, and from here by deeper-draft vessels for the last 120 miles, is simply to enjoy one grand excursion that will repay anyone who can afford the time and expense. It is one of the most sublime voyages that can be taken anywhere upon the globe. The ice does not leave St. Michael very early, and for this reason those who wish to get there at the earliest possible date would be obliged to travel by the ocean route.

The beach at Cape Nome is free from ice later and earlier than at St. Michael. If you will take one of the coast charts you can learn how very shallow the water is and how far it is to a safe landing or anchorage; when the wind is southerly it soon causes the combers to roll in, and as it increases the surf beats with tremendous force upon the strand. It is sometimes several days before it is safe to make a landing. The Alaska Commercial Company had a small, well-built lighter—high, rounded well on the ends, and tightly decked—with firm stanchions built on each side. By making the line fast ashore and to the stern of their steamer *Sadie*, this lighter can be guided and worked well in a small surf, the last swell taking her up well on the sand. All owners of vessels who intend to send them hence in the spring should see to it that they have the best of ground tackle and that they are supplied with an abundance of good line.

Several craft went ashore during a light blow in August.

Port Clarence on one side and Golofnin Bay on the other are the nearest and best harbors. A railway connecting these two places will be a necessity if the district produces half what is expected of it next year.

The formation upon Anvil Creek is a mica schist with an abundance of quartz. It is only 4 to 6 feet to bed rock and there is very little trouble with frozen earth, and hardly any stone or rock to handle, most of it being fine enough to go through the sluices to the dump. One owner exhibited a small bottle of garnets about the size of peas, which he saved when he was making his clean ups. The ordinary prospector or miner who goes there need hardly bother himself about taking in supplies, for this camp is unlike any other in that it is accessible to all kinds of sailing crafts, and there will therefore be a strong competition among the merchants to supply all customers on the ground. It will be a great task and care for single individuals to purchase their outfits before starting, have them properly put up for shipment, then to make terms for freighting them, take the risk of damage or loss in transit, and then the great care that will have to be given in making a landing and in protecting the goods when piled on shore. All intending shippers should not forget that, unless otherwise contracted for, the vessel's responsibility ceases when the goods are delivered in the ship's slings. Men of small means can hardly afford to take all these risks. The man who lands

at Cape Nome with his money, or, better still, with power to draw drafts, will be better off every way. If he becomes disgusted and thinks that it is all exaggerated or becomes homesick, as many do, he will not have to put up his outfit and auction it off for a fraction of its cost, but can jump on the next steamship and go home. The large companies, as the Alaska Commercial Company, the North American Trading and Transportation Company, Alaska Exploration Company, and others, are already on the ground with new buildings and warehouses. They are anxious to serve customers.

Gold (quartz mining).—The year's progress in this industry has been most gratifying. The managers of the Treadwell plant felt that life is too short for the treatment of that immense mass of ore with the 240-stamp mill, which had been doing duty so long and well. Accordingly they have constructed other mills and needful accessories thereto, and now have in operation a total of 880 stamps; old mill, 240 stamps; new mill, 300 stamps; the Alaska United Gold Mining Company, 220 stamps (which embraces the plant on the Ready Bullion Mine and that on the 700-foot claim); the Mexican Mine, 120 stamps. All these are under the same management, and Mr. J. P. Corbus is the superintendent on the ground. The ninth annual statement of the Alaska Treadwell Mining Company is Mr. Corbus's report for the year ending May 31, 1899.

Ore mined and milled.

	Tons.
110-foot level	213,069
220-foot level	37,339
Total	250,408

The amount above, of ore, was mined at a cost of $193,637.99, or $0.773 per ton. In arriving at the mining cost per ton as above, no allowance was made for ore mined and on hand in our pits and stopes, estimated at between 40,000 and 50,000 tons.

No. 2, main shaft, is now down to a depth of 506 feet, with a connection made by crosscut to 220-foot level, and with skip chutes at 220, 330, and 440 foot levels, the chute at 220-foot level having a capacity of 500 tons of ore, while the other two have a capacity of 250 tons each. No discoveries of importance were made on either 110 or 220 foot levels. On 220-foot level we made a connection in No. 5 east drift with No. 1 shaft of Alaska United Company's 700-foot claim. The end of this No. 5 east drift is in ore that will average $3.50 per ton, while crosscut from No. 5 east drift shows a width of about 95 feet that will go $4 per ton. On 330-foot level no work was done other than cutting station and skip chute. On 440-foot level, where we have run a crosscut from wall to wall, we find the vein to be about the same width as on the 220-foot level, but average assay value is not so good, a considerable portion of the vein being mixed with granite and slate. At present can not state how far this disturbance extends, but hope it is only local. From present developments on 440-foot level it is safe to say there is a width of 160 feet of ore that will pay to stope, but in making estimate of ore in sight, as given below, no account is taken of ore that may be below 220-foot level.

Below you will find an estimate of the amount of ore now in sight and available for mill, with a statement showing assay value of ore of different sections of the mine.

ORE RESERVES.

Estimate of ore in sight May 15, 1899:	Tons.
Adit and 110-foot level	1,888,000
220-foot level	2,289,000
Total	4,177,000

Mill.—During the period under review there was crushed at 240-stamp mill 250,408 tons of ore, at a cost of $69,511.67, or $0.2776 per ton. The actual running time of mill was 353 days 2 hours and 50 minutes, steam power being 111 days 8 hours and 40 minutes and water power 241 days 18 hours and 10 minutes.

The chlorination works closed down in January and the concentrates are shipped to Tacoma, on Puget Sound. The 300-stamp gold mill is described thus:

Three-hundred-stamp gold mill.—This mill, manufactured by Fraser & Chalmers, Chicago, was erected on the beach adjoining our chlorination works, and distant about 1,200 feet from our shafts and hoisting works. The timbers in mill are Washington fir, while lumber for floors, walls, roofs, etc., is Alaska spruce. The mill is driven by water power, and is of latest improved design, comprising sixty 5-stamp batteries, arranged in two lines back to back, 150 stamps in each line. Each stamp weighs 1,050 pounds, and each battery of five stamps is driven by belt and tightener from line shaft.

Many other important additions have been made, such as the hoisting and crushing plant; widening a ditch, at an expense of over $17,000; Reidler pumping engine, $6,785; addition to the sawmill, costing $4,700, and the foundry. The paragraph on labor is interesting. Mr. Corbus says:

Through the year labor was plentiful, the wages paid being as follows: Machine drillers, $2.50 per diem summer, and $3 in winter, with board and lodging and bonus; machine helpers, $2.25 per diem with board and lodging; mine laborers (whites), $2 per diem with board and lodging; mine laborers (Indians), $2 per diem without board and lodging; amalgamators, $90 per month with board and lodging; feeders, $70 per month with board and lodging; vanner men, $65 to $100 per month with board and lodging; machinists and helpers, $3 to $6 per diem with board and lodging; blacksmiths, $4 per diem with board and lodging; blacksmiths' helpers, $2 per diem with board and lodging.

The bullion statement for twelve months is as follows:

Tons crushed, 250,408; tons sulphurets saved and treated, 4,912.90; yield free gold, $441,282.88; per ton in free gold, $176. Yield sulphurets, $236,372.88; per ton from sulphurets, $48.11; total yield, $677,655.13; total yield per ton, $2.71, making a total showing from the beginning to May, 1899, as follows: Tons crushed, 2,786,421; yield free gold, $6,146,989.55; tons chlorinated, 52,200.1; yield, $2,419,543.52; total yield, $8,566,523.07; total yield per ton, $3.07; operating profits, $4,533,947.33; operating costs per ton, $1.45.

We have the third annual statement of the Alaska United Gold Mining Company; this embraces two milling plants, the Ready Bullion Mine and the 700-foot Claim. On the former there is a total tonnage of ore developed and in sight at this time as follows:

Adit level, 84,000 tons; 300-foot level, 55,000 tons; 450-foot level, 189,000 tons.

During the past year there has been a 120-stamp mill erected, the stamps weighing 1,050 pounds each. This mill was framed on Puget Sound, and only the very best Oregon pine was used in its construction. The foundation for the mill is constructed on different lines from the ordinary practice here. Instead of using mortar blocks of wood, we put in a very heavy concrete foundation, about 8 feet wide at the base and extending the entire length of the mill. Upon this concrete foundation, under each 5 stamps, we placed a cast-iron anvil block weighing about 7 tons. This block was bolted securely to the concrete foundation, the top of the block being planed to receive the mortar. This arrangement does away with the possibility of the foundation decaying or rotting out, as it does in mills where the wooden mortar blocks are used, the life of a wooden mortar block being only of about ten years' duration. This mill has about forty-eight 6-foot Frue vanners, that is two vanners for each 5 stamps. In this mill we have made a change from the former practice here by using manganese steel tables instead of cast-iron tables for our ore feeders, and by using what is known as Blanton fasteners for our cams and cam-shaft pulleys. We consider the Blanton fasteners or wedges a great improvement over the old method of fastening cams by keys. We started crushing ore on the 15th of November, and during the forty-seven days elapsed the mill ran forty-three days, crushing 19,612 tons of ore.

Power plant consists of an 18 by 30 by 48 cross compound surface-condensing Corliss engine, with the necessary condensing apparatus. We have installed a very complete boiler plant, consisting of four boilers of the Heine make of 202 horsepower each. Our experience here with this type of boiler has been very satisfactory. The old 240-stamp mill at the Treadwell has always used this type of a

boiler, and we have found them very economical in fuel and requiring very little repair. We have also installed a Riedler compressor, which has a capacity of 40 air drills. Compressor is run by a cross-compound condensing Corliss engine of the latest type. This plant is very complete in every particular.

Since the above report was sent in this mill has been put in operation and kept steadily at work. On the 700-foot claim, the total tons of ore in sight amounted to 280,000 tons.

The shaft on this mine is a three-compartment vertical one. If the vein continues at the present dip we should intersect it with shaft at a vertical depth of between 600 and 700 feet. This shaft is equipped with a head gear, ore bins, and a rock crusher with a capacity of 50 tons per hour. We also have winding engines that will work the mine to a depth of 1,000 feet.

The mill on this mine consists of 100 stamps of the same weight, and is built on much the same lines as the Ready Bullion mill, with a crushing capacity of 4 tons per stamp per day of twenty-four hours. At the present time we only have water power for this mill, as we considered it advisable to start with water power alone, and if after a few months' experience we found everything satisfactory, a steam plant would be installed.

The sixth annual statement of the Alaska Mexican Gold Mining Company is brought down to December 31, 1898. During the year, 162,457 tons of ore were sent to the mill. The cost of mining was $1.07 per ton and of milling $0.3166 per ton.

At present the general appearance of the mine is good. Following is an estimate of the ore in sight: Adsit level, 112,654 tons; 110-foot level, 71,800 tons; 220-foot level, 188,850 tons; below 220-foot level, 72,200 tons.

Tonnage developed shows that we now have enough ore in sight to keep the mill at work at least two and a half years. Last year our mill ran by water power 194 days and by steam power 155½ days, a total of 349½ days out of a possible 361 days, the crushing duty per stamp being 3.87 tons per day of 24 hours.

The only addition of machinery to the plant for the last year was one No. 6 Gates crusher, to take the place of two small Comet crushers, size "C."

The following shows the bullion statement for the year: Tons crushed, 162,457; tons sulphurets saved, 3,366; tons sulphurets treated, 3,402; yield free gold, $257,409.39; per ton in free gold, $1.58; yield sulphurets, $118,397.69; per ton sulphurets, $34.80; total yield, $375,882.36; total yield per ton, $2.31.

This wonderful system of mining plants challenges the admiration of all real mining men who have constantly endeavored to build up this industry into a legitimate business. From the starting of these works upon Douglass Island, the management has been conservative, straightforward, and certain. It has given tone and dignity to every similar enterprise in the district. All Alaskans point to it with pride, for we all feel that all the good ore in Alaska is not confined to one little corner of Douglass Island. The opportunities here offered for practicable instruction in the profession of mining should not be overlooked by our educational institutions which are endeavoring to train young men for this business. Alaska leads to-day, and will continue to lead educated men and men who have been actually trained in the mines and in the mills. The leaders in this great management of mining in these works have well-established characters for benevolence and public spirit; they no doubt will lend every reasonable facility to any faculty who are anxious to send their young men here for training.

It is a pleasure to be able to give such an amount of information concerning these works. The late superintendent, Robert Duncan, jr., has passed away. The works had grown up under his supervision. He was highly esteemed by all who knew him or had any business relations with him. He was succeeded by a worthy successor, Mr.

J. P. Corbus, his brother-in-law, who has had many years experience as Mr. Duncan's assistant.

When we consider the low grade of ore upon which these mills are run, we can understand how much is due to constant care and brains if the stockholders are to share in any profits.

Back of Juneau, in Silver Bow Basin, quartz mining is going on vigorously. The 30 stamps of the Juneau, Alaska, mill have been steadily at work during the season. This mill is a good producer for the length of time in which it has been operated. Below it, on Gold Creek and nearer Juneau, is a mill operated by Mr. E. B. Ebner. It is kept running nearly all the year through. There are several properties under development in this basin, and the work so far performed is showing up a large amount of good ore.

About 4 miles south of Juneau is Sheep Creek. One mill has been in operation here for several years on ore that produces silver as well as gold. The works were shut down part of the year. A number of claims on this creek are under development. As we go south the next place where quartz mining is going on is at Fort Snettishham.

Mr. John N. Tisdale has undertaken to develop a group of claims here and feels much encouraged over his prospects. Farther to the south are the Bald Eagle and the Sum Dum Chief claims. These properties are gold producers, but we have no data for publication in this report.

Ketchikan, upon Tongass Narrows, is now the center of a district in the extreme southeastern portion of Alaska, wherein is a keen interest in quartz mining. The sea-level claims are now ready for operation, and a milling plant will soon be erected.

The Apollo Consolidated, upon Unga Island, one of the Shumagin group, has been kept steadily at work throughout the year, and has been a pretty steady producer, with a 40-stamp mill, at the rate of about $30,000 per month. They have erected additional works, have 10 more stamps dropping, and will soon increase this by 10 more. Some quartz ledges have been located on the mountain above Anvil Creek, and development work was begun in September. About 30 miles back from the head of Golofnin Bay, there are several claims which have been located for a number of years, and a considerable amount of work is done upon them; two vessels have been wrecked in attempting to transport the ore to San Francisco. It is a galena ore, rich in silver and carrying considerable gold. Mr. James Deitrick reports large veins of quartz on a branch of the Koyukuk, north of Peavy. He claims that the ledges are large, carrying gold and silver in masses of galena.

All the district north of Juneau, along the mainland, is rich in quartz ledges, and in the neighborhood of Berner's Bay there are several mills at work, but we have no certain facts to give in reference to their operation.

COPPER.

Although Alaska is not sending any copper to market, we believe that in the near future it is destined to become one of the large producers of this metal. From time immemorial copper has been among the natives, and has always been traced back to the region north of Mount St. Elias. Last year some prospecting parties brought out a considerable amount of native copper near the head of White River. This year Mr. John J. Healy, of the North American Trad-

ing and Transportation Company, obtained a slab of native copper, 142 pounds in weight, from somewhere near the sources of the Tanana. This he has sent to Mr. John Cudahy as an ornament for his office in Chicago. Masses of ore have been found upon the shores of Prince William Sound and upon some of the islands therein, which carry a large percentage of copper. These are accessible, and, like the ore upon Douglass Island, could be worked at a small profit per ton. One company has been spending a good deal of money this year in doing development work, and if this comes up to expectations, ample works will be erected. Quite recently large quantities of ore have been discovered on Prince of Wales Island, near the head of Kasaan Bay and at other points. The assays of this ore show it to be rich in copper. A number of discoveries have been made on branches of Copper River and upon Tanana, but little will be done probably with the ore in these regions until such time when a railroad shall have been built to connect the waters of Prince William Sound with the Yukon River.

CINNABAR.

For some years cinnabar has been reported to have been found on the head waters of the Kuskoquim River. Prospectors are now on the ground to investigate this matter and to search for the ore.

PLATINUM.

A discovery of this metal was made this season in Disenchantment Bay, which is not far from Yakutat. The metal is found in quartz, though not in placer. The miners were crushing and working it, and one miner said that he had cleaned up 2 pounds when they were overtaken by the earthquake and tidal wave on the 17th of September and they lost everything they had, camp outfit, boat, clothing, and all. They think that they have made a very important discovery, and will find the ore. If they succeed in demonstrating this, it will be a very interesting discovery in the history of mining.

It will be seen from the above that placer and quartz mining in Alaska have reached large proportions, and what we now have seems only to be the promise of greater things in the future. Mining is the one industry which is drawing the multitude, but it will be as it was in California and other countries, where people soon gave their attention to other resources which were quite as remunerative as mining and whose development was necessary for the successful working of the mine. We believe that the gold products of Alaska this year will be in amount something more than $4,000,000, probably a sum which will be equaled by the value of the salmon pack of the country.

COAL.

The Alaska Commercial Company and the North American Trading and Transportation Company have been mining coal and using it this past season upon their steamers on the Yukon River. They get much better results from steaming with coal than from cord wood.

The Chignik Bay Coal and Fish Company have mined enough to supply the local traffic. Mr. James McClaskey and others have taken out a number of tons on the lagoon, Admiralty Island. A company has been at work upon the coal measures at Anchor Point, Kachemak

Bay, Cooks Inlet, and there are many other places where coal has been discovered.

The laws for the purchase of coal lands have not been extended to Alaska by Congress, but should be at the earliest opportunity.

REINDEER.

This interesting animal belongs to the frozen zone. He loves and thrives upon a moss which is popularly known as "reindeer moss."

This valuable member of the vegetable kingdom grows to the very border of the Northern seas. The reindeer has been domesticated for generations, and has afforded the Lapp, the "Chuck-chee," and other tribes of northern Asia certain subsistence. His flesh is nutritious, and especially rich in carbon, a requirement in food for those cold regions. The milk is utilized and made into cheese, the horns are made use of in many ways, and there is nothing that can be compared to the reindeer skin for clothing to withstand the rigor of a Northern winter. In fact every part of the animal is utilized, and for transportation he is used for drawing and packing loads. All the foregoing was well established years ago. When the officers of our revenue service made their annual cruises to Bering Sea and the Arctic Ocean and saw the helpless condition of the Eskimo, they wondered why these natives could not be supplied with reindeer and be as certain of subsistence as are the people just across Bering Straits who are supplied with herds. These officers could well understand that the animals upon which our people were depending were procured with greater difficulty each year. The seal, the walrus, and the whale were game for the white man, who with his superior appliances could chase them beyond the reach of the native. It was a question, too, whether the natives on the Alaska side would be willing to abandon their dogs and settle down to the lives of herders, whether they really valued the reindeer enough to make the change. A great many other questions came up which nobody could answer—would the "Chuck-chee" be willing to sell them; if so, could they be transported, and if they were successfully transported, would they be protected from the ferocity of the huskiy and malamute dog?

The occasion demanded a man of a peculiar type, and, like Cæsar, "He came, he saw," and, in the opinion of the friends of this enterprise, has "conquered." Dr. Sheldon Jackson became so impressed with this problem that he could not help but give it his immediate attention. He began to collect all possible information in regard to the animals and concerning Alaska as being fit ground for their cultivation. The Bureau of Education, under its Commissioner, Dr. William T. Harris, has wisely determined to try to give these Eskimos an industrial education in the art of rearing these animals. Such knowledge will make for their salvation for the life that now is. It was hard to prevail upon Congress to make an appropriation to start such an enterprise. Money was raised by an appeal through the public press, and a trial was made. Thoughtful men in both Houses of Congress pondered over this question, and the more they did so the more it met with their approbation. It was through them that the Government made its first appropriation. Very few people have really kept posted in this matter, but many have not hesitated to ridicule it, and have steadily endeavored to bring it into disrepute. Even editors of some of our newspapers have been reviling its chief promoter and speak of the enterprise as a "fad." This

may have been brought about in part by the failure to carry supplies to the Klondike in the winter of 1897–98. The purchase of several hundred of these animals in Norway and Lapland and their shipment across the Atlantic and the Continent, and by steamship again from Seattle to Haines Mission, and the dying of a large percentage of them at that point, and all the subsequent evils, had nothing whatever to do with the problem of the introduction of domestic reindeer into western and northern Alaska for the use of the Eskimos. When editors and writers raise the cry of "failure" and "fad" they simply show that they are not acquainted with the facts, or, if they are, that they are prejudiced and are not willing to stick to the truth.

At the very time that the cry of starvation was raised in the newspapers concerning the miners on the Klondike, another cry went up that a large number of whalers at Point Barrow were caught in the ice and unless they got relief many would starve to death before spring. Accordingly, the revenue cutter *Bear* was outfitted and sent off to give relief. She landed a party of three officers—Lieutenants Jarvis and Berthoff and Dr. Call. Under conditions that try men's souls, they made their way from the spot where they were landed at Cape Vancouver, a long distance south of the Yukon River, around the margin of the coast, till they came to the missionary reindeer station at Port Clarence. Here Mr. W. T. Lopp and the native Eskimo, Antisarlook, at the earnest entreaty of Lieutenant Jarvis, turned over their herds of reindeer to him, amounting in all to 437 animals; and the natives not only parted with their animals, but volunteered to go with Lieutenant Jarvis to drive them to Point Barrow. After several fearful weeks they reached that station and gave immediate relief to those hungry men and kept them alive until the ice pack broke up. About 100 of these animals had to be slaughtered. Surely there was no "fad" about reindeer at this point. The food that they afforded kept 200 souls alive. Who has ever seen a single notice of this event to the credit of the reindeer, the missionary, or the native? Attention was called last year to the heroism of the abovementioned officers. It will surely compare well with any act of bravery that has occurred within recent years, and we think that Congress should not allow another session to pass without giving them due recognition. The Treasury Department should feel proud that it, too, has men who are willing to dare and do and lay down their lives if necessary when duty and necessity demand them.

It is well ascertained now that there is pasturage for several millions of reindeer in northern Alaska. The Government, by purchase and increase, has succeeded in getting about 3,000 to the present time. Laplanders have been brought over as instructors, and a number of the natives have been brought up under their care. They are all anxious to obtain herds. The animals have been given out to missionary societies under certain conditions. One of these is that they are to return the number intrusted to them at the end of five years, they keeping the increase. The animals are prolific; half the yearling does will have fawns at the end of their first year and about half of these fawns will live and come to maturity. The great question is, how to get more of these animals. Since the excitement at Cape Nome began, the whites are beginning to understand what utility there is in a reindeer. There is great competition now for the purchase of the skin for clothing; the price has gone up from $1.50 to $8

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This interesting animal belongs to the frozen zone. He loves and thrives upon a moss which is popularly known as "reindeer moss."

This valuable member of the vegetable kingdom grows to the very border of the Northern seas. The reindeer has been domesticated for generations, and has afforded the Lapp, the "Chuck-chee," and other tribes of northern Asia certain subsistence. His flesh is nutritious, and especially rich in carbon, a requirement in food for those cold regions. The milk is utilized and made into cheese, the horns are made use of in many ways, and there is nothing that can be compared to the reindeer skin for clothing to withstand the rigor of a Northern winter. In fact every part of the animal is utilized, and for transportation he is used for drawing and packing loads. All the foregoing was well established years ago. When the officers of our revenue service made their annual cruises to Bering Sea and the Arctic Ocean and saw the helpless condition of the Eskimo, they wondered why these natives could not be supplied with reindeer and be as certain of subsistence as are the people just across Bering Straits who are supplied with herds. These officers could well understand that the animals upon which our people were depending were procured with greater difficulty each year. The seal, the walrus, and the whale were game for the white man, who with his superior appliances could chase them beyond the reach of the native. It was a question, too, whether the natives on the Alaska side would be willing to abandon their dogs and settle down to the lives of herders, whether they really valued the reindeer enough to make the change. A great many other questions came up which nobody could answer—would the "Chuck-chee" be willing to sell them; if so, could they be transported, and if they were successfully transported, would they be protected from the ferocity of the huskiy and malamute dog?

The occasion demanded a man of a peculiar type, and, like Cæsar, "He came, he saw," and, in the opinion of the friends of this enterprise, has "conquered." Dr. Sheldon Jackson became so impressed with this problem that he could not help but give it his immediate attention. He began to collect all possible information in regard to the animals and concerning Alaska as being fit ground for their cultivation. The Bureau of Education, under its Commissioner, Dr. William T. Harris, has wisely determined to try to give these Eskimos an industrial education in the art of rearing these animals. Such knowledge will make for their salvation for the life that now is. It was hard to prevail upon Congress to make an appropriation to start such an enterprise. Money was raised by an appeal through the public press, and a trial was made. Thoughtful men in both Houses of Congress pondered over this question, and the more they did so the more it met with their approbation. It was through them that the Government made its first appropriation. Very few people have really kept posted in this matter, but many have not hesitated to ridicule it, and have steadily endeavored to bring it into disrepute. Even editors of some of our newspapers have been reviling its chief promoter and speak of the enterprise as a "fad." This

are on the increase, but in other places they are declining in number. The estimate of the native population as given last year may be taken this year, namely, natives and Russian creoles, 31,064.

Many things have transpired to cause an increase in the white population. The increase in the mining industries in southeastern Alaska has brought in more of a permanent population. This is seen in the large increase in the number of school children. A great many men have left the Northwestern Territory and have scattered out in all directions through Alaska. Twenty-four thousand whites may be taken as a conservative estimate.

CENSUS.

The Director of the Census, appreciating the value of accurate information concerning Alaska, took the matter up at once, divided the Territory into two parts, appointed Mr. Sam C. Dunham as superintendent of the northern division and Prof. William A. Kelly superintendent of the southern division. These gentlemen have their commissions and instructions, and they have gone vigorously to work. Both of them have large acquaintance with the Territory, and they are putting forth every effort to make the work of the census complete and accurate. The value of this work can be understood, since we are now left to guess at many important things which should be definitely known. The accuracy of the census for 1880 and 1890 could not be relied upon on account of the revelations concerning the man who was in charge of the work during those years, which came to light when the Bering Sea matters were under discussion. We shall look forward to the completion of the census for this year with great interest.

SCHOOLS.

At the time of the transfer the country was placed under military rule, and until Congress should take some action no one could assert any right, as the following will show:

DEPARTMENT OF STATE,
Washington, D. C., October 28, 1867.

GENERAL: In the absence of specific legislation by Congress for the organization of land districts in Alaska, claims of preemption and settlements are not only without the sanction of law, but are in direct violation of the laws applicable to the public domain. Military force may be used to remove intruders if necessary. Will you have the goodness to instruct Major-General Halleck to this effect by telegraph, and request him to communicate the instruction to Major-General Rousseau, of Sitka?

WILLIAM H. SEWARD.

Gen. U. S. GRANT,
Secretary of War and Interior.

Notwithstanding the rigor which could be brought to bear at any time, the people of Sitka organized a city government by the election of a mayor, council, and other officers, and put the same into operation. This action was acquiesced in and really encouraged by Gen. Jefferson C. Davis, then in command, and Sitka at the time had nearly 5,000 inhabitants. One of the most pressing needs was that of a school. It will not be amiss here to quote from the records of the common council.

and $10 for a summer pelt. The meat brought in from Siberia by schooners was selling at $1 per pound. The draft animals were used last winter in conveying Government stores to Cape Nome and in doing hauling for the missionaries who had claims on Anvil Creek. It is related that a miner by the name of Hank Summers, who has prospected in southeastern Alaska and in various parts of the Yukon Valley, and has finally reached the coast near Port Clarence, says that he no longer wants or cares for dog teams, though these animals have done him faithful service in the past. This past year he has had one stag deer; he puts a load of 200 pounds on his back and strikes off to the place which he desires to prospect. All he has to do with his deer is to stake him out—the moss is on the ground ready for him. A man with 10 of these animals could strike off with an outfit to support him a whole year. If it ever became necessary he could kill one of them for food. It is believed that if our Western stockmen understood well what great advantages are to be enjoyed in the raising of these animals in those regions, they would put large amounts of money into such enterprises. There can be no doubt that the cowboys would soon become deerboys and soon surpass the Lapp or Chuckchee in the rearing and handling of these interesting animals. At the present time trained animals would bring $125 per head at Cape Nome.

We are told that they can be reared at an expense not exceeding $7 per head, some say even as low as $4 per head. Mr. W. A. Kjellmann, who has been the superintendent of the Government herd for several years, tells us some interesting things concerning this animal. When not feeding or resting they spend most of the time in training their horns, which while in the velvet are very tender; by throwing their heads back on their shoulder they cause them to curve forward, but most of the training of the horns is done by their hind feet. This they do by continually stroking the horn to bend it forward; they start prongs where they please by kicking the tender shaft in a spot till it bleeds, when a bud will start; by turning their eyes in the sockets they seem to be able to look at their horns and endeavor to make one correspond with the other. Seldom or never have they horns alike. As proof of these statements, he relates that one deer which was blind in one eye was not able to train his horns on the blind side, but that it grew in an ugly shape; another deer which was injured in its thigh and was not able to use its hind feet as heretofore, had its horns grow up in straight shafts. Another interesting fact is that there is an oil duct between the toes of their hind feet, and that when the animal sheds its horns he keeps the place well oiled by rubbing his foot over it. It is known that in parts of Siberia these animals are larger than the ones now obtained from the Chuck-chee. Photographs of them carrying Russian engineers and their theodolites have been seen. The Bureau of Education is now endeavoring to make the necessary agreement with Russian merchants to furnish a number of these animals, and in fact to supply as many as can be purchased.

Late this fall two white traders who are married to Eskimo women and who have been successful at Cape Nome, have applied to Dr. Jackson each for a herd of 100 head to be taken at the price which it costs the Government. How can it be possible for the Government to make a mistake in fostering and encouraging such an enterprise?

POPULATION.

We can not talk on this topic with any accuracy. The native people in many places are holding their own, and in a few places they

are on the increase, but in other places they are declining in number. The estimate of the native population as given last year may be taken this year, namely, natives and Russian creoles, 31,064.

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School records of the common council of Sitka, Alaska, 1867–1878.

PETITION FOR A SCHOOL.

SITKA, *December 18, 1867.*

Hon. W. S. DODGE,
Mayor of the City of Sitka:

The undersigned, voters in said city, hereby request that you will call a meeting of the legal voters therein, as prescribed by section 16 of city charter, in order to give the council power to establish such a system of public schools as it may see fit and proper to adopt.

(Signed by 49, two of whom made their x mark.)

PURCHASE OF SCHOOL BUILDING.

At a special meeting of the common council, October 27, 1868, among the proposed actions was the purchase of a suitable building for the use of the city as a public school, and to which was added the proposition of the Masonic lodge about to be organized here to advance one-half the purchase money and, as a consideration, take a lease of one-half of the building for the term of ninety-nine years.

This having been discussed and favored by the council, Judge Storer introduced resolution No. 87, which was adopted:

"*Be it resolved by the council*, That the mayor be, and hereby is, empowered to purchase for the use of the city, from the Russian-American Company, the building opposite the club house, No. 56 in the map and inventories attached to the protocol of the treaty of transfer."

Approved: W. S. DODGE.

PORTION OF SCHOOL BUILDING LEASED TO A MASONIC LODGE.

REGULAR MEETING OF CITY COUNCIL,
November 13, 1868.

At the request of Mr. Storer, the mayor submitted his action with regard to the purchase of a building for city purposes.

The deed for the same (No. 56) was read and approved, and ordered placed among the archives of said city. The deed is considered as a voucher for the payment of the consideration money, $300

W. S. DODGE, *Mayor.*

The back rooms on lower floor and attic were leased for ninety-nine years to Alaska Lodge, F. and A. M., in consideration of $150.

OCTOBER 27, 1868.

SCHOOL TRUSTEES.

REGULAR MEETING OF COMMON COUNCIL, *January 21, 1869.*

Mr. Parker introduced resolution 113, which was passed.

[Resolution 113.]

"Whereas the mayor has informed the common council that the city is about to come into possession of the building No. 56, which building was purchased for school purposes in December last: Now, therefore,

"(*1*) *Be it resolved*, That under and by virtue of Article V of the amendments to the city charter, the council do appoint a board of trustees, consisting of two lawful citizens and freeholders, whose duty it shall be to make all necessary provisions pertaining to the fitting up of the said building and the speedy establishment of a public school.

"(*2*) *Be it resolved*, That said board of trustees shall make due report to the council of all things necessary for the successful maintenance of said school, and to make such recommendations in all things pertaining to the same as they may deem proper for the consideration and action of the council.

"(*3*) *Be it resolved*, That the mayor be ex officio president of the said board of trustees, and shall preside at the meetings of the said board, and shall have kept in a proper book a record of its transactions."

Approved.

W. S. DODGE, *Mayor.*

JOINT MILITARY AND CIVIL CONTROL OF PUBLIC SCHOOL.

SPECIAL MEETING, *March 20, 1869.*

Council met at 7 p. m., pursuant to a call issued by the acting mayor, for the purpose of taking into consideration the best method of managing the affairs of the public school in conjunction with the "post council of administration." On motion of Mr. Storer resolution 119 was carried unanimously:

"*Resolved*, That B. C. Montague, Aaron Levy, and Patrick Burns be chosen trustees of the public school on behalf of the city for the ensuing year."

Previous to the passage of this resolution the council adopted ordinance No. 36.

SCHOOL TRUSTEES AND THEIR DUTIES.

[Ordinance No. 36.]

Be it ordained by the city council of the city of Sitka:

SEC. 1. That a board of three trustees shall be chosen by the city council annually, in the month of March, for the purpose of managing the affairs of the public schools in the manner hereinafter prescribed.

SEC. 2. Said trustees shall, together with such others as may be joined with them by the post council of administration, select a competent teacher for said school; fix the compensation of said teacher; adopt such text-books as they may see fit to prescribe; regulate the laws of instruction; provide fuel and other necessary articles for the use of the school, and have a general supervision of the care of the schoolhouse.

SEC. 3. Said trustees shall, before making any expenditure of money for the school, communicate to the city council in writing the amount needed by them and the purposes for which such money may be required. They shall not incur any liabilities or make any expenditures until the same are approved by the city council.

SEC. 4. The trustees shall make to the city council semiannual reports of the condition of the school, together with an account of the receipts and expenditures therefor.

SEC. 5. The trustees chosen by the city council shall confer with the post council of administration in all matters connected with the school.

SEC. 6. The trustees chosen by the city council shall hold office from the 1st of April one year to the 1st of April of another; provided, however, that the board first elected under this ordinance shall serve from the time of their election until the 1st of April, 1870.

SEC. 7. This ordinance shall take effect from and after its passage.

C. B. MONTAGUE, *Acting Mayor.*

HALL OF CITY COUNCIL, *January 28, 1873.*

A communication from George R. McKnight, esq., tendering his resignation as a member of the board of trustees of the Sitka public school, was read, and on motion his resignation was accepted, whereupon Henry E. Cutter was elected to fill the vacancy. On motion Maj. J. Stewart was elected to fill a vacancy in said board of trustees, occasioned by the departure of Lieutenant Mitchel.

From this time on until the withdrawal of the United States troops in 1877 the city government waned and died, and with it the school. This was the only school attempted in the Territory, except those kept by the Alaska Commercial Company on the Pribilof Islands, and it was exclusively for the creoles and whites. The natives were then, as many still assert them to be, too "unsavory" to be considered or touched.

In the spring of 1878 the Presbyterian Board of Home Missions sent a missionary to Sitka, and a school was opened for the natives. Upon the complaint of the whites that they were neglected, this same missionary urged Miss Pauline Cohen to open a school for these children, which she did. The children of the Greek Church were allowed to attend upon the condition that the priest should be allowed to teach them one hour each day. This was agreed to. Miss Cohen held out faithfully for a year, obtaining her compensation by subscription.

Mr. A. E. Austin, a citizen of New York City, moved to Sitka in

1879 and took up the school work for the whites that year. The following year his daughter was commissioned to teach the natives, and Mr. Austin's family moved to Sitka. Mr. Austin's younger daughter then joined with her father in teaching the white children.

Section 13 of the organic act, approved May 17, 1884, provided:

> That the Secretary of the Interior shall make needful and proper provision for the education of the children of school age in the Territory of Alaska, without reference to race, until such time as permanent provision shall be made for the same, and the sum of twenty-five thousand dollars, or so much thereof as may be necessary, is hereby appropriated for this purpose.

On March 2, 1885, the Secretary of the Interior assigned the duty of making provision for the education of children in Alaska to the United States Commissioner of Education. Dr. Sheldon Jackson was appointed general agent of education April 10, 1885. The commissioner was well satisfied that he had appointed the right man to perform the tasks which he had marked out. (See note LXIII Report of Commissioner of Education, 1884–85.)

From this beginning until the present time the Bureau of Education has had charge of Alaska educational matters. The white children did not increase to any noticeable degree until 1897. Where they were in sufficient numbers, as at Sitka and Juneau, separate schoolhouses were built and furnished for them. Congress could not be prevailed upon to increase the amount of the annual appropriation, which was kept at $30,000. The work which the bureau had in hand consumed this amount for each year, and it was impossible for it to build new houses and furnish them and supply teachers unless the appropriation was increased.

This has been clearly enough set forth in the reports of the governor for 1897 and 1898. The reasons were given why the amount should be increased to $60,000. They are stronger and more urgent to-day. Skagway and Dyea sprang up as if by magic. Family life at once assumed large proportions. The erection of 640 additional stamps at the Treadwell brought more families to Douglas. New enterprises in the neighborhood of Juneau multiplied family life there. Fort Wrangell had a boom in real estate, and her school wants were felt. Considerable discontent has been aroused. Somebody is to blame. Who is it? Here is a fine opportunity to strike a blow, and it was seized by the foreman of the last grand jury. Dr. Sheldon Jackson is the culprit. Attack him and pour all possible abuse upon him. Some of us have been in Alaska a long time, many years before the foreman of this grand jury, who was once the governor of this district. The educational agent was a stumbling block to him then. He demanded his removal, and believing that he had secured it, so announced it before leaving the deck of the steamer on his return to Sitka from Washington. This is enough to show that there has been an animus of long standing. In view of the four able paragraphs which he wrote concerning education in Alaska from 1885 to 1888, inclusive, this attack upon a Government officer, who has for so many years performed his duty faithfully and well, is altogether unworthy of the ex-governor. It is a very poor way in which to get even. The fault of deficiency in school facilities does not lie with Dr. Jackson, and no better showing can be made on this subject than is set forth so vigorously in one of the paragraphs mentioned above, viz, in Governor's Report for 1886, page 20.

We need more schools and more teachers because the number of children is increasing. Those children who have been in primary

grades need to be advanced to higher grades, but this is impossible unless the means are provided. If Congress provide that the larger towns may organize themselves into municipal governments, granting them power to handle their own school affairs and setting apart a sufficient amount of the sum received for the licenses to sell intoxicating liquors toward their support, then the school question need no longer be a vexed one.

Those who are interested in the subject of education in Alaska can learn much by reading Senate Doc. No. 137, Fifty-fifth Congress, second session. The following letter shows its origin:

DEPARTMENT OF THE INTERIOR,
Washington, February 14, 1898.

SIR: I have the honor to acknowledge the receipt of a resolution of the Senate, dated the 19th ultimo, as follows:

"That the Secretary of the Interior be, and is hereby, directed to furnish to the Senate an account in detail for each year of all moneys heretofore appropriated by Congress for educational purposes in the Territory of Alaska, and the manner in which such appropriations have been expended, particularly showing—

"First. The location, cost, character, dimensions, and date of construction of each building erected.

"Second. The name and location of each school aided to any extent from Government appropriations in said Territory and the amount of such aid, or the cost thereof if furnished in the form of materials or supplies.

"Third. The auspices under which the respective aided schools have been or are being conducted.

"Fourth. The name of each person now or heretofore employed or paid by the Government from such appropriations, the place, date, duration, and nature of employment, and the compensation paid.

"Fifth. The number of pupils enrolled in each aided school, the length of the school term, and the cost per capita for board, clothes, and tuition.

"Sixth. The food or clothing furnished the respective schools, the cost thereof, by whom and how purchased and paid for.

"Seventh. The amounts paid for traveling, or for other miscellaneous purposes, with the items, date, and cause of the expenditures, and by whom made.

"Eighth. The amount appropriated and expended for reindeer for use in said Territory, by whom disbursed, to whom and when paid, and the number, cost per head, location, and condition of such reindeer."

In response thereto I transmit herewith a copy of a letter from the Commissioner of Education, of the 10th instant, to whom the resolution was referred, inclosing a report covering the information desired.

Very respectfully,

THOS. RYAN, *Acting Secretary.*

The PRESIDENT OF THE UNITED STATES SENATE.

It is earnestly recommended that a sum not less than $60,000 be placed at the disposal of the Bureau of Education to meet the costs of schools for the ensuing year.

LAWS.

On the 3d of last March an act to define and punish crimes in the District of Alaska and to provide a code of criminal procedure for said District was approved. This has been well received and is really a great blessing. It gives the court much more liberty in obtaining juries and a man can now be tried by a legal jury. The act took effect on the 1st of July, and those sections which provide for the selling of intoxicating liquors in the District have been pretty generally complied with. Heretofore there were ten places in Sitka where liquors were sold, in defiance of the law; now there are but two, in compliance with the law. The act has had similar effects in all the other places.

The smuggler's occupation is gone because it has been made unprofitable. The shipments of liquor into the Territory in July were very

hows very clearly that the smuggling business was
ve and that nearly all the liquors were of foreign
came into Alaska by the way of Fort Simpson.
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those who violate its provisions. Sections 460 and
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have time to give very great con-
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n it reconsider the law set forth in
people of Alaska what in their fair
just.

CODE OF PROCEDURE.

store for us a civil code and civil
with a joint resolution of Congress,
ommissioners who were appointed to
United States. It was sent by them to
im to the Speaker of the House. In
oned criminal code through the Senate,
s offered as an amendment, but it was
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continues to be chairman of the Commit-
aws, will take up with his fellow commit-
is civil code and civil code of procedure
soon as possible. With such a body of well-
ivil laws our courts could move smoothly.

LAND LAWS.

called in previous reports to the fact that the
neral land laws have been denied to the citizens
ing laws are all right; we have no complaint in
it still remains a fact that a poor man can not
ased for his home and go to the land office and
An act was approved May 14, 1898, extend-
laws, limiting the holding to 80 acres. This
fact that homesteads can be located only upon
applicant goes to the land office, he is told
as the following communication on the

DEPARTMENT OF THE INTERIOR,
GENERAL LAND OFFICE,
Washington, D. C., October 28, 1898.

[Adolf Ellefsen. H. E. on unsurveyed land held for calcellation.]

REGISTER AND RECEIVER, *Sitka, Alaska.*

GENTLEMEN: I am in receipt of your letter of October 5, 1898, transmitting the papers in the case of homestead entry No. 1, made October 4, 1898, by Adolf Ellefsen, on a tract of unsurveyed land containing 5 acres.

It appears that you have allowed the party a leave of absence from the land for a period of nine months from October 5, 1898.

You state that you desire a ruling by this office as to the future acceptance of such filings; that you have interpreted the circular issued June 8, 1898, under the act of Congress approved May 14, 1898 (30 Stat., 409), to mean that, while entry may not be perfected and patent issued until the system of public surveys is extended to this district, yet, in order that the bona fide settler may have the advantage of a record of his date of settlement and occupancy of his land he may file in this (your) office his application and the usual accompanying affidavit.

On page 4 of the circular of June 8, 1898, relating to section 1 of the act of May 14, 1898, it is stated in rule 3 that existing homestead laws, while recognizing settlement upon unsurveyed public lands, do not authorize the entry or the patenting thereof until the public surveys have been regularly extended over them; that section 1 of this act (May 14, 1898), however, in terms authorizes the entry of unsurveyed land in Alaska through the exercise of soldier's additional homestead rights; but this does not apply to the general homestead right.

Your action allowing said entry and leave of absence was, therefore, erroneous, and Ellefsen's entry is accordingly held for cancellation.

You will so inform him, using Form 4–485, and of his right of appeal.

Serve notice and make report in accordance with circular of October 26, 1896 (5 L. D., 204).

Very respectfully, BINGER HERMANN, *Commissioner.*

The provisions in the above-mentioned law allowing settlers upon unsurveyed lands to acquire title by means of soldiers' additional homestead rights can be taken advantage of only by those who are able and willing to pay dearly for them. This scrip comes anywhere from $10 to $30 per acre, and before anyone can make an entry he must have it surveyed by a United States deputy surveyor at his own expense. This work must be approved by the surveyor-general, and when so approved he can go with his plat, field notes, and scrip and make his entry before the register and receiver. Nothing has retarded and is retarding the real growth of Alaska so much as the prohibition in the organic act in not allowing the extension of the general land laws of the United States to Alaska. We know that in the passage of the last sundry civil bill the Commissioner of the General Land Office had the part appropriating an amount for surveys so amended that Alaska was to be included. We know that there are great difficulties in the way, and that many things have to be taken under consideration in beginning a system of surveys in this vast area.

And right here, in order to show how large Alaska is, it may be well to contrast it with the areas of the following States:

State.	Square miles.	State.	Square miles.
Maine	29,895	Rhode Island	1,085
Vermont	9,135	Pennsylvania	44,985
Connecticut	4,845	Delaware	1,960
New York	47,620	Virginia	40,125
Maryland	9,860	North Carolina	48,580
New Jersey	7,455	Georgia	58,980
West Virginia	24,645	Alabama	51,540
South Carolina	30,170	Tennessee	41,750
Florida	54,520		
Mississippi	46,340	Total for all these States	570,255
New Hampshire	9,005		
Massachusetts	8,040	Total for Alaska	579,890

large, and this shows very clearly that the smuggling business was great and extensive and that nearly all the liquors were of foreign manufacture and came into Alaska by the way of Fort Simpson. There is no evidence that drunkenness has increased. The license fees are high and the safeguards are numerous, and there being such a general approval of the law, we feel that the communities are better protected now than they were before. It is believed that juries will be quick to punish those who violate its provisions. Sections 460 and 461 of said code provide for a tax on business and trades. This part of the law has been discussed from various points of view. A few lawyers have advised their clients to question its constitutionality, and they are taking the necessary steps to do so. There has been more complaint, however, on the ground that it is not equitable. The men who are in the fish business say that the tax laid upon them amounts to 1 per cent of the value of their products, while a tax of $3 a stamp on quartz mills is but a minimum of their product, and the sawmill man, who is paying 10 cents per thousand, thinks that he is paying more in proportion than the miner. The general criticism, however, is that Congress should have provided that the amount of money collected from the sale of liquors and as a tax on business and trades should be expended for various purposes in Alaska, such as education, roads, etc.

We know that Congress did not have time to give very great consideration to this general tax feature of the code, and we earnestly recommend that at its next session it reconsider the law set forth in sections 460 and 461, and give the people of Alaska what in their fair and sober judgment is right and just.

CIVIL CODE AND CIVIL CODE OF PROCEDURE.

We know that Congress has in store for us a civil code and civil code of procedure. In accordance with a joint resolution of Congress, this work was prepared by the commissioners who were appointed to codify the criminal laws of the United States. It was sent by them to the Attorney-General and by him to the Speaker of the House. In the passage of the above-mentioned criminal code through the Senate, the civil code of procedure was offered as an amendment, but it was rejected because there was not time for its proper consideration. We hope that Mr. Warner, if he continues to be chairman of the Committee on the Revision of the Laws, will take up with his fellow committeemen, at an early date, this civil code and civil code of procedure and enact them into laws as soon as possible. With such a body of well-considered criminal and civil laws our courts could move smoothly.

LAND LAWS.

Attention has been called in previous reports to the fact that the advantages of the general land laws have been denied to the citizens of Alaska. The mining laws are all right; we have no complaint in regard to them, but it still remains a fact that a poor man can not take up a piece of land for his home and go to the land office and obtain title to the same. An act was approved May 14, 1898, extending the homestead land laws, limiting the holding to 80 acres. This is inoperative, from the fact that homesteads can be located only upon surveyed land. When an applicant goes to the land office, he is told that he can not obtain title, as the following communication on the subject will show plainly:

DEPARTMENT OF THE INTERIOR,
GENERAL LAND OFFICE,
Washington, D. C., October 28, 1898.

[Adolf Ellefsen. H. E. on unsurveyed land held for calcellation.]

REGISTER AND RECEIVER, *Sitka, Alaska.*

GENTLEMEN: I am in receipt of your letter of October 5, 1898, transmitting the papers in the case of homestead entry No. 1, made October 4, 1898, by Adolf Ellefsen, on a tract of unsurveyed land containing 5 acres.

It appears that you have allowed the party a leave of absence from the land for a period of nine months from October 5, 1898.

You state that you desire a ruling by this office as to the future acceptance of such filings; that you have interpreted the circular issued June 8, 1898, under the act of Congress approved May 14, 1898 (30 Stat., 409), to mean that, while entry may not be perfected and patent issued until the system of public surveys is extended to this district, yet, in order that the bona fide settler may have the advantage of a record of his date of settlement and occupancy of his land he may file in this (your) office his application and the usual accompanying affidavit.

On page 4 of the circular of June 8, 1898, relating to section 1 of the act of May 14, 1898, it is stated in rule 3 that existing homestead laws, while recognizing settlement upon unsurveyed public lands, do not authorize the entry or the patenting thereof until the public surveys have been regularly extended over them; that section 1 of this act (May 14, 1898), however, in terms authorizes the entry of unsurveyed land in Alaska through the exercise of soldier's additional homestead rights; but this does not apply to the general homestead right.

Your action allowing said entry and leave of absence was, therefore, erroneous, and Ellefsen's entry is accordingly held for cancellation.

You will so inform him, using Form 4–485, and of his right of appeal.

Serve notice and make report in accordance with circular of October 26, 1896 (5 L. D., 204).

Very respectfully, BINGER HERMANN, *Commissioner.*

The provisions in the above-mentioned law allowing settlers upon unsurveyed lands to acquire title by means of soldiers' additional homestead rights can be taken advantage of only by those who are able and willing to pay dearly for them. This scrip comes anywhere from $10 to $30 per acre, and before anyone can make an entry he must have it surveyed by a United States deputy surveyor at his own expense. This work must be approved by the surveyor-general, and when so approved he can go with his plat, field notes, and scrip and make his entry before the register and receiver. Nothing has retarded and is retarding the real growth of Alaska so much as the prohibition in the organic act in not allowing the extension of the general land laws of the United States to Alaska. We know that in the passage of the last sundry civil bill the Commissioner of the General Land Office had the part appropriating an amount for surveys so amended that Alaska was to be included. We know that there are great difficulties in the way, and that many things have to be taken under consideration in beginning a system of surveys in this vast area.

And right here, in order to show how large Alaska is, it may be well to contrast it with the areas of the following States:

State.	Square miles.	State.	Square miles.
Maine	29,895	Rhode Island	1,085
Vermont	9,135	Pennsylvania	44,985
Connecticut	4,845	Delaware	1,960
New York	47,620	Virginia	40,125
Maryland	9,860	North Carolina	48,580
New Jersey	7,455	Georgia	58,980
West Virginia	24,645	Alabama	51,540
South Carolina	30,170	Tennessee	41,750
Florida	54,520		
Mississippi	46,340	Total for all these States	570,255
New Hampshire	9,005		
Massachusetts	8,040	Total for Alaska	579,890

It can not be wondered at, therefore, that the people are very impatient. Some, indeed, have waited for an opportunity to acquire title since the time of the transfer, thirty-two years ago. We have the land offices established, and they are ready to do the business. We earnestly solicit that the committees on public lands, both in the House and the Senate, will look into these matters and afford the necessary relief.

TOWN SITE FOR SITKA.

The town of Sitka is nearly one hundred years old. At the time of the transfer Russia and the United States sent commissioners here under instructions from their respective Governments to make out schedules of property. This is all set forth in Executive Document, H. R. No. 125, Fortieth Congress, second session. These commissioners made five inventories: Inventory A, Public property, forts, and buildings; Inventory B, Property belonging to the Græco-Russian Church; Inventory C, List of names of persons holding property in fee simple; Inventory D, Private property in houses, but not fee simple to the land upon which they stood; Inventory E relates to buildings on the island of Kadiak. Certificates of ownership were issued and signed by these commissioners. These were recorded in the town records, and during the last thirty-two years sales and conveyances have been made from time to time. The first building mentioned in Inventory D was a warehouse which was sold to some Americans by the returning administrator of the Russian-American Company. Their right of ownership to it was denied by the commanding officer of the place, who took possession of it. In due time they brought suit for damages, Congress going so far as to allow them by a special act to begin their suit in the Court of Claims. That court decided against the claimants and they took an appeal to the Supreme Court, whose opinion is given in 150 U. S., page 483.

The gist of the decision is in the last paragraph of the opinion, as follows:

> The truth is that the whole case of the claimants depends upon the question whether the Government was bound by the proceedings of the commissioners in the execution of the treaty. As we have already expressed the opinion that they possessed no power to vary the language of the treaty or to determine questions of title or ownership, it results that their action was not binding upon the Government.
>
> The judgment of the court below is therefore affirmed.

This ruling therefore, leaves the tenure of these holdings in doubt. Up to that time the Greek Church title, the titles under Inventory C, were regarded as treaty titles. Land matters in Sitka are further complicated by the fact that President Harrison, by Executive order, June 21, 1890, made reservations of several plots of ground none of which has ever been accurately surveyed. It will thus be seen that the people of Sitka are not in a position to take advantage of the provisions of an act of Congress approved March 3, 1881, providing for the disposal of public land in the Territory of Alaska for town-site purposes.

It is urged, therefore, that Congress provide that the Secretary of the Interior, through the Commissioner of the General Land Office, survey all these holdings and give the history of the same, and report the whole matter to Congress for its future action.

MISSIONS AND THEIR HOLDINGS.

Any observing and fair-minded man who passes through Alaska can not help but notice and be favorably impressed with the work which the missionaries have already accomplished for the natives wherever they have taken up their stations among them. Considering the time that they have labored and the means with which they have wrought, their works have been fruitful. Many of these people obtain no salaries and are supplied by their societies with the barest necessities only. None feel more deeply than the missionaries how far short they come of accomplishing what ought to be done, but they toil on through evil and good report. From a pecuniary point of view these missionaries save the Government many thousands of dollars in keeping down lawlessness, which would cost very much to punish, either by our military force or by our single court, if there was no such effort put forth to save these people.

The organic act of May 17, 1884, in section 8, provides—

> That the land not exceeding 640 acres at any station now occupied as missionary stations among the Indian tribes in said section, with the improvements thereon erected by or for such societies, shall be continued in the occupancy of the several religious societies to which said missionary stations respectively belong until action by Congress.

The time has now arrived for Congress to secure to all these missionary societies, without further delay, their holdings by a patent. Some are disturbed now and others soon will be by the encroachments of settlers. Congress has abundance of precedent for such action by what it did for similar societies in Oregon, Idaho, and Washington.

REVENUE-CUTTER SERVICE IN ALASKA.

The general public can hardly appreciate the magnitude of the service which this branch of the Treasury Department has given to Alaska.

The sending of the *Corwin* and the *Bear* to the Arctic for years to assist and rescue disabled whalers and to seize desperate villains and turn them over to the court, the many courtesies extended to the lonely missionaries, the patrol of Bering Sea and the North Pacific by the cutters for the protection of the seals, and their visits to the canneries and fishing stations have been an immense labor well performed.

Our country should feel proud of the able and patriotic men who render it this service. The thanks of the officers of this district are hereby extended for the courtesies rendered this season. The *McCulloch* was sent to St. Michael to convey the officers from that point to Sitka; they were Judge Johnson, United States Marshal Shoup, Clerk Elliot, Assistant District-Attorney Daly, Timber Inspector May, Educational Agent Dr. Jackson, and the governor. St. George Island, Unalaska and Dutch Harbor, Unga, Kodiak and Wood Island, and Yakatut were visited on the way to Sitka.

TRIP OF THE OFFICERS DOWN THE YUKON.

The people along this river have been sadly neglected; they have seldom been visited by an official higher in authority than a commissioner.

The new criminal code came into effect on July 1. Judge Johnson felt it imperative that he, with his court, take the trip and give those

people a reasonable opportunity to comply with the license features of the new act, appoint commissioners under the authority of said act, and the marshal to appoint deputies under similar authority, and transact whatever other business might be possible under the allotted time. Stops were made at Eagle City, Circle City, Rampart, St. Michael, and Cape Nome. Court was opened at Circle City and a grand jury impaneled. Some indictments were brought in and arrests made; warrants were issued and the defendants bound over. On the trip many declared their intention to become citizens of the United States, and some took out their second papers. Court was opened at Cape Nome. Some attorneys were admitted to the bar, many suits were begun, and the judge was earnestly besought to stay and determine the issues. These questions involved mining ground of great value, and of course the defendant, being in possession, would stand upon his legal rights and claim advantage of all possible delays. The court found it impossible to remain long enough to get at the issues in controversy. The moral effect of this visit at this particular juncture was very great and can not well be overestimated. People were assured that Congress has no hostility toward anybody in Alaska, but that, on the contrary, it is now in a willing mood and will afford relief at the earliest opportunity. This was warranted by the efforts which were made to pass the measure which is popularly known as the

CARTER BILL.

This is Senate bill No. 3729. It was brought in by the Senate Committee on Territories in March, 1898, and passed through that branch and went to the Committee on Territories in the House, where it was given in charge of a subcommittee, which did not urge its passage at that session. Last year the measure was taken up by Mr. Knox and his committee, who gave several hearings in their committee room to several Alaskans, and who also considered the communications which were forwarded to them by the Juneau Chamber of Commerce, wherein many serious objections to the bill were pointed out. This committee reported the bill as it came from the Senate, with very few changes. Many persons in Alaska, not knowing what opposition there was, were bitterly disappointed. The measure was an effort to make further provision for a civil government for Alaska, and, notwithstanding its objectionable features, it would have afforded us very great relief, and rather than to have nothing its friends hoped that it would become a law before the close of the session. When Mr. Knox finally obtained the floor, and asked unanimous consent, objection was made, and this killed it. The consequence is that the people up and down the Yukon Valley, along the entire western coast of Alaska, are left helpless, and millions of dollars invested in steamships, steamboats, canneries, and mercantile enterprises are left without any adequate protection whatever. The question now is, Will Congress allow this state of affairs to continue? We sincerely hope that it will not. The erection of three additional courts would meet present and future wants for many years to come. The more we have pondered over this question the more we believe that a less number will not give the desired relief. This is owing to the immense size of the Territory and because the people are taking hold of these resources in all directions, and communities are growing up thousands of miles apart.

If the business could be concentrated two courts would get through with it very easily, but such suggestions are idle. Courts must be

adapted to the necessities of the people. The location of these courts and the places where and the times when they shall be held should be left to the discretion of the Attorney-General. It is impossible to tell what six months may bring forth in this country. No doubt in the spring and summer there will be 20,000 people at Cape Nome, by September next there may be 5,000 people on the Franklin Mountains, Mount Grenough, in northeastern Alaska, or there may be hundreds of men with dynamite shivering the ice on the beach around Point Barrow.

Experience has already taught us that it is rash for any man to assert that any square mile of this Territory is worthless. It would be wise, therefore, for Congress to make the legislation for the creation of additional courts so elastic that the Department of Justice can adapt them to the needs of the population. Much else could be said concerning this bill. If Congress should see fit to grant us a Delegate, of course we shall be pleased, but until more courts are established and commissioners appointed, and until we shall get some local unit of organization, it will be very difficult and expensive to hold an election.

The granting of additional courts and the establishment of telegraphic communication will afford the most good to the greatest number of people.

MILITARY FORCES.

The War Department has entered Alaska with its forces, and troops are now stationed at Fort Wrangell, Skagway, Prince William Sound, Cook Inlet, Cape Nome, St. Michael, Fort Gibbon, Rampart, Circle, Fort Egbert, near Eagle City. The troops on the Yukon are under the command of Col. P. H. Ray. This officer has had long experience in arctic Alaska, two years at Point Barrow in charge of the meteorological station and in the winter of 1897 upon the river, most of the time at Fort Yukon.

The different stations are well outfitted for the winter with food, clothing, and all necessary tools and machinery. The Colonel has great faith in Alaska and will use his forces in opening up a road from Valdez to Eagle City by cutting out a trail and building way stations a few miles apart. For two years past expeditions have been sent out by Captain Abercrombie, who bas been stationed at Valdez. These have crossed the country with horses and come out upon the Yukon at Eagle. An expedition was sent out by Captain Glenn from the Snushitna River across to the Yukon. Colonel Ray will utilize the information thus gained and make it possible for prospectors to go over that country with pack trains. The most alluring part of Alaska to-day for the prospector is the region between Prince William Sound and Eagle City. It is across here that we confidently expect to see the Alaska Central Railroad built in a few years.

Colonel Ray and his fellow-officers are placed in a very delicate position; the commissioners along the river have very little legal authority, and in the absence of courts it is difficult for an officer to determine how far he shall proceed in preserving order. There was some complaint at military interference at Cape Nome this past summer. Whatever rights may have been invaded and violated, one thing is sure, that there was no bloodshed, and order was maintained. We all, by inheritance and instinct, resent military interference in our affairs, and no doubt these very officers share with us these same feelings. We must trust to their good, hard, common sense. We

hope that Congress will recognize the delicacy of the position in which they are placed, and that before another year rolls over our heads affairs will be changed for the better.

The military reservation at St. Michael takes in a circle described by a hundred-mile radius from the flagstaff at that place as a center. This is regarded as unnecessarily large. It commands not only the mouth of the Yukon, but the Yukon several hundred miles up; it commands Golofnin Bay and the whole of Norton Bay. This gives the officer in command tremendous authority, especially over the shipping, and if he should be an evil-minded man, immense mischief could be wrought before the Secretary of War could be communicated with and the necessary negotiations transacted. No such thing has occurred nor threatens to occur, but if it does, a whole season will have to be wasted by a shipowner or a corporation before any wrong could be righted.

ALASKA NATIONAL GUARDS.

The organic act, in defining the duties of the governor, provides that "He shall be, ex officio, commander in chief of the militia of said district, and shall have power to call out the same when necessary to the due execution of the laws and to preserve the peace, and to cause all able-bodied citizens of the United States in said district to enroll and serve as such when the public exigency demands."

About ten years ago an attempt was made to organize the militia, but the impression got abroad that it was more for the show and parade of the official staff than for organizing to meet ugly emergencies, and the matter was not taken up by Governor James Sheaklay when he entered upon his term of office. Matters have since changed and the best people are urging the organization. Our war with Spain has helped to create the feeling, and such sudden exhibitions of violence and destruction which we have read of as occurring in Idaho have taught us our helplessness.

The young men at Skagway, Juneau, and Douglas have organized companies. Mr. F. D. Kelsey, of Juneau, a member of the Alaska bar, who has had much experience as an officer of the National Guard in the State of Oregon, was appointed adjutant-general with the rank of colonel.

A beginning has thus been made. We hope that this matter will gain the hearty approval and cooperation both of the Interior and War Departments.

OUR VISITORS.

The steamship *George W. Elder* was fitted up for an expedition and chartered by Mr. E. H. Harriman, of New York. Mr. Harriman was accompanied by his wife and children, and by his relatives, Mr. W. H. Averell and family, of Rochester, N. Y. He invited as his guests for the cruise to Alaska—

Prof. John Muir, of California.
Dr. D. G. Elliot, of Chicago, Ill.
John Burroughs, of West Park, N. Y.
Prof. William H. Brewer, of Yale University.
Charles A. Keeler, of Berkeley, Cal.
D. A. Saunders, psycologist, of South Dakota.
R. Swain Gifford, artist, of New York City.
Charles Palache, mineralogist, of Cambridge, Mass.
E. C. Starks, of Washington, D. C.
G. K. Gilbert, geologist, of Washington, D. C.
Julius L. Johns, of Washington, D. C.
A. K. Fisher, United States Geological Survey, of Washington, D. C.
William Trelease, Missouri Botanical Garden, St. Louis, Mo.

N. B. Devereau, Glenwood, Colo.
Dorothea Draper, New York City.
Henry Gannett, United States Geological Survey, Washington, D. C.
C. Hart Merriam, Chief United States Geological Survey, Washington, D. C.
William H. Dall, Smithsonian Institution, Washington, D. C.
Frederick V. Coville, botanist of the United States Department of Agriculture, Washington, D. C.
Lewis R. Morris, M. D., New York City.
Rev. George F. Nelson, New York City.
Trevor Charles Digby Kincaid, University of Washington.
B. E. Fernow, director State College of Forestry, Cornell University.
Louis Agassiz Fuertes, Ithaca, N. Y.
Dr. Edward L. Trudeau, jr., Saranac Lake, N. Y.
Robert Ridgway, Washington, D. C.
William E. Ritter, professor of zoology, University of California.
Frederick S. Dellenbaugh, New York.
Prof. Benjamin K. Emerson, geologist, Amherst, Mass.
Thomas H. Kearney, jr., Washington, D. C.
E. S. Curtis, Seattle, Wash.
W. R. Coe, Yale University, New Haven, Conn.
George Bird Grinnell, New York City.
Leon J. Cole, Ann Arbor, Mich.
Louis F. Timmerman, New York City.
Duncan G. Inveraity, Seattle, Wash.

It is seldom that so many men eminent in science and literature ever were afloat together upon one vessel for a cruise. All matters of detail touching the welfare of the guests and the success of the expedition were given personal attention by Mr. Harriman. They had a programme for the employment of their time; they seemed to come up to it very strictly. The results of this expedition can not but be beneficial to Alaska. All these well-known scientists will have much to say upon their special subjects, and their impressions will be read by the public with interest. The incredulous will take their testimony as coming from unprejudiced sources so far as the physical features of Alaska are concerned. The *Elder* made stops at all important places in southeastern Alaska and along the coast line as far as Bering Straits, thus taking in a wide sweep of territory. We here in Alaska hope that this will be the forerunner of many similar expeditions. Shortly after the departure of the *Elder* from Sitka, the U. S. S. *McCulloch*, W. C. Coulson, captain, arrived with Senator Fairbanks and his party on board. He was accompanied by Mrs. Fairbanks and son, Senator E. G. and Mrs. Foster, Hon. Robert G. Evans, Minneapolis, J. Carl Baine, and Mr. E. O. Graves, president of the Seattle Chamber of Commerce. We were very glad to welcome Senator Fairbanks to this portion of the United States, since he is chairman of the American part of the Joint High Commission and has thus necessarily much to do with Alaskan matters as they come before that body. We wish that he and the other members of his commission and some of the officers of the State Department also might visit southeastern Alaska and see the country with their own eyes. Senator Fairbanks has done this, and we feel certain now that he grasps the situation and knows the justness and value of our contention over the boundary question. He and his guests were cordially received everywhere by our citizens, who felt the importance of his visit.

Soon after the departure of the *McCulloch* the steamship *Queen* arrived bringing the Hon. Sereno E. Payne, chairman of the Ways and Means Committee and also one of the commissioners of the Joint High Commission; Hon. John Dalzell, of Pittsburg, Pa., a member of the Ways and Means Committee; Hon. Joel P. Heatwole, of Minnesota, a member of the Committees on Foreign Affairs and Census; Hon. John A. T. Hull, of Des Moines, Iowa, chairman of the Committee on Military Affairs; Hon. V. Warner, of Clinton, Ill., chairman of the Committee on Revision of the Laws; Hon. George W. Steele, of Marion, Ind., member of the Committee on Ways and Means. The Hon. E. J.

Hill, of Norwalk, Conn., member of the Committee on Banking and Currency, came by a preceding steamer, and the Hon. F. W. Mondell by a succeeding steamer. Then came Senators George C. Perkins, of California, chairman of the Senate Committee on Fisheries, member of Committees on Appropriations and Naval Affairs. Last, Senator George L. Shoup, of Idaho, chairman of the Committee on Territories and a member of four other important committees. The Hon. William Sulzer, of New York City, a member of the Committee on Military Affairs, spent some time hunting in Southern Alaska. We are glad to make this record, for never before has Alaska found so many of our Congressional legislators willing to pay her a visit. We know that these gentlemen have made use of their opportunities and have learned many things that they could not have obtained out of books or official reports. We know, too, that they are now impressed with the thought that the legislation which this Territory needs should be granted without further delay. Many important and prominent citizens have also visited these shores; among them may be mentioned Mr. John D. Rockefeller, Henry Villard, Miss Caroline Phelps Stokes, and Mr. James Oliver, of New York City; Dr. William C. Gray, editor of the Interior, of Chicago.

The Presbyterian ministers of Puget Sound chartered the passenger steamship *City of Seattle* and visited Alaska in the capacity of a synod. They held their sessions on board, and as they went from point to point they gave encouragement to those who are engaged in mission work. The business men of Seattle, catching the spirit of the times, chartered the same steamship and sent her here with a large party of her leading merchants and prominent citizens. Such excursions are valuable, for it brings us into close touch with our own countrymen and will teach us that we have a community of interests which is very strong.

CABLE AND TELEGRAPH.

Enough has been said to impress upon the mind of anyone who reads this report how vast are the interests which the United States has in Alaska. Here will be found children of all the States, from Maine to Florida, from Texas to Oregon, and they are of the true American type. The time has now arrived to bind these interests and these children to their early homes and to the institutions under which they were born and bred, by the subtle and powerful influence of electricity. The United States owes it to its own dignity to do so.

A cable should be laid to connect Cape Flattery with Mount Edgcomb; thence to Prince William Sound; thence to Dutch Harbor. Mount Edgcomb should be connected by cables with Juneau, Skagway, Fort Wrangell, Ketchikan. Wires should be put up from Valdes to Eagle City and from Eagle down the Yukon to St. Michael and Cape Nome. This should be done and put under the control of the Post-Office Department. Our neighbors are ahead of us in this regard. The Dominion government has constructed lines this season from Lake Bennett and by this time have it nearly completed to Dawson. Already it has been found desirable and expedient to send our large transports loaded with stores, animals, and troops by way of Dutch Harbor as the shortest and probably the most desirable route from Manila to Puget Sound. It no longer requires a prophet to foretell that the Americans are going to carry on a tremendous commerce upon the Pacific Ocean. We must get at the markets which Siberia, Japan, China, and Polynesia are opening up

to us. If a large lot of this commerce is to sweep around by the North Pacific, it is not too much to ask that these means of intelligence be provided, maintained, and operated by the Government.

POSTAL FACILITIES.

We all feel grateful to the Post-Office Department for what they are doing for us. This Department has always been Alaska's friend and we do not forget it. We know that for the past two years our demands have been great and the difficulties almost insuperable. Much good work has been done this season in getting matters straightened out. We hope that the time will soon arrive when this Department can send mails regularly to the most distant settlement within the confines of Alaska.

In Appendix B of this report will be found some important matter on this subject, communicated by the Second Assistant Postmaster-General.

YUKON AND WHITE PASS RAILWAY.

This was a great undertaking in railroad construction. The difficulties for engineers to overcome were great and many, especially for the first 20 miles. Connection was made with the river steamers at Lake Bennett in July, and there is now a continuous freight and passenger traffic. The promoters of this enterprise have not asked Congress for any subsidy. As soon as a right of way could be obtained they went to work and put it through in a wonderfully short time. In 1897 it was an awful task for a man to get over this pass with an animal and a pack. Those who succeeded in doing so spent many days at it. Some men and many animals perished in the attempt. The price was as much as 40 cents per pound. To-day the trip across is one of comfort and pleasure and can be made in four hours, and freight is carried at 3 cents per pound.

The scenery along this short road is so grand, and, as it can be enjoyed so easily from the cars, it is now added to the tourist route and all feel repaid by taking the ride to Lake Bennett and return.

UNITED STATES COAST AND GEODETIC SURVEY.

The work so far accomplished by this branch of the Treasury Department is very important. It is brought into daily use by our navigators. This work must be accurate, and it requires time; there is an enormous amount of it yet to be done before shipmasters can be furnished with reliable charts. Prince William and Norton sounds need immediate attention. We know that the Superintendent is thoroughly alive, and knows well the needs of the shipping interests. The *Patterson* and the *Gedney* were at work here all this summer. We hope that Congress may be generous and not allow this work to drag for want of sufficient means.

LIGHT-HOUSE DISTRICT.

A year ago attention was called to the necessity of organizing Alaska into a light-house district. This should be done without delay, for the value of the shipping has advanced into the millions of dollars and must advance to still greater figures. The extent of coast

line is enormous, and the aids to navigators are confined to a few buoys and spindles. We have not a single light-house. Here again our neighbors are in the lead. Last year they built four light-houses at difficult points and have continued the work this year. It will require an able, seaworthy tender for this service.

UNITED STATES CUSTOMS OFFICE.

The collector of this district reports that up to June 30 there were for the fiscal year—

Duties on imports	$40,941.16
Tonnage tax	2,587.93
Fines, penalties, and forfeitures	879.70
Miscellaneous customs receipts	1,720.20
Wharfage	2,376.70
Official fees	2,808.48
Total	51,314.17
Number of vessels entered from foreign ports	350
Number of vessels cleared for foreign ports	362
Number of vessels entered from domestic ports	428
Number of vessels cleared for domestic ports	504
Entries of merchandise for duty	374
Entries of merchandise free of duty	83
Entries for warehouse	6
Entries for export to adjacent British provinces	2,858

NEW METLAKAHTLA.

Some distance south of Port Simpson, British Columbia, which is just across from the Alaska line, near the Portland Canal, is Old Metlakahtla. About forty-two years ago William Duncan, a short, energetic young man but recently arrived from Manchester, England, moved to this spot with a band of Tsimshean natives. Here, under the leadership of Mr. Duncan, they started upon a new life. He had been sent out by the Church Missionary Society. He set himself to acquire the native language and has succeeded so well that now he finds it more difficult to use the English language than the native tongue. The Bible has been their great text-book; they have been taught to keep the Sabbath day holy; the gospel of work has been taught and enforced. Mr. Duncan is the embodiment of energy; there is not a lazy fiber in his whole make-up. After a chain of most unfortunate events, which it is not necessary to relate here, Mr. Duncan felt constrained to leave British Columbia with his flock and seek a home elsewhere. Mr. Duncan first went on to Washington and told his story to those who were then in authority. He was received very kindly wherever he went, and from the encouragement which he received, upon reporting to his people, they determined to move into Alaska. They did so in the fall of 1887 and settled upon the west side of Annette Island, at a place called Port Chester. In remembrance of their old home they named this settlement New Metlakahtla. They had to lay their foundations anew and work on in a very self-denying way. To-day they have a village that is admired by all who visit that place. They have a sawmill, waterworks which have cost $9,000, a cannery wherein they packed this season 12,400 cases, and a shop wherein they build boats. They have several miles of sidewalks made of plank and the ground is laid out into lots and streets, and the people have built themselves comfortable frame houses. They

have stores which are filled with choice goods, the council house or town hall, a schoolhouse, and, above all, a magnificent church which would be an ornament to any civilized community.

Their form of government is by a kind of town council, elected annually, but Mr. Duncan is really their lawgiver and he sees to it that it is executed. They are self-supporting and are proud of their own ability to provide for themselves. They number about 1,000 souls. Section 15, of an act approved March 3, 1891, reads:

That until otherwise provided by law the body of lands known as Annette Islands, situated in Alexander Archipelago in southeastern Alaska, on the north side of Dixon's entrance, be, and the same is hereby, set apart as a reservation for the use of the Metlakahtla Indians, and those people known as Metlakahtlans who have recently emigrated from British Columbia to Alaska, and such other Alaska natives as may join them, to be held and used in common, under such rules and regulations and subject to such restrictions as may be prescribed from time to time by the Secretary of the Interior.

This piece of legislation in the opinion of many people is a trouble breeder. It introduces into Alaska the reservation system of handling natives, a system which has been roundly condemned by those who know its workings. These natives are a hard-working and reliant people. Mr. Duncan can give employment in his sawmill and cannery and boathouse to not more than 5 per cent of his people. They make no attempt at the cultivation of the soil, nor do they attempt stock raising. The great majority of them scatter through British Columbia and southeastern Alaska, working in the sawmills, canneries, and salteries. Many go to the State of Washington in hop-picking season. Under present conditions they can not be confined to Annette Island and support themselves. In the fishing season, when they go with their boats and seines to fish beyond their own limits, they clash up against their neighbors, who tell them to "go back and stay on their reservation where they belong." It is the same in cutting timber. In a sense they are Ishmaelites. To aggravate this whole matter, minerals have been discovered upon Annette Island, and miners say they are very rich. Mr. Duncan has had them examined, and his experts have informed him that they do not amount to much. At any rate, Mr. Duncan wants the miners to stay away from the island, as he is fearful that they will edge in and have a corrupting and demoralizing influence among his people. This is about the present situation of affairs there. Mr. Duncan's younger men are branching out into business for themselves, and some have a store on Annette Island and sell goods in competition with the large store in the same place.

Another company of young men own and operate a sawmill at Port Gravina, about 16 miles from Annette Island. This past season they made 80,000 salmon cases and are now running their mill night and day and employ a total force of about 50 people. These are nearly all Tsimsheans. Another company of young men are about to erect a sawmill in the neighborhood of Ketchikan. The question now is, What is the best thing to be done so that Mr. Duncan shall not be ruthlessly disturbed in his work and at the same time be at peace with his neighbors. His people have now arrived at that degree of intelligence and civilization that they look upon American citizenship as a great blessing, and they are all anxious to declare their intentions to become citizens. In a few instances the courts have allowed this. It would seem to us that the best way out of this muddle, which would be a very bad precedent when we consider that we

have 30,000 natives who are real Alaskans and not from British Columbia to deal with, is to confer the right of citizenship upon these Metlakahtlans and give them the right to take up 160 acres of land each upon Annette Island. Then, as citizens, the laws are open to them. They can incorporate and become as exclusive as they desire. The hope of citizenship should be held out to all these natives. We can not afford to try to execute our own laws and give validity to the customs and usages of the natives. "One law for all and all amenable to the law" should be the motto. The natives are ready for such a declaration.

INCOME FROM LICENSES.

Mr. Albert D. Elliot, the clerk of the district court, reports from July 1 to September 30, 1899, as follows:

Number of liquor licenses issued	99
Number of miscellaneous licenses issued	313
Amount collected on liquor licenses	$88,000
Amount collected on miscellaneous licenses	24,370
Total amount collected	112,370

The clerk, having to prepare for the coming term of court to be held at Juneau, is not able at present to give detailed information concerning these licenses. The amount which was collected on the Yukon trip is segregated:

Number of liquor licenses issued	32
Number of miscellaneous licenses issued	120
Total number of licenses issued	152
Amount collected on liquor licenses	$20,500
Total amount collected on said trip	33,544

Mr. Elliot says: "A few applications for licenses made previous to September 30 are not included in the above for the reason that said licenses had not been issued on account of defective applications which must be amended."

The tax on canned and salt salmon is not included in the above, nor the tax upon stamp mills, save one or two exceptions. The judge has had a good deal of difficulty in trying to determine and decide what is the intention of Congress in the application of this law; for instance, there is no provision for giving a liquor license to a steamboat.

It was rather amusing as the 1st of July drew near to find the saloon men out in the middle of the night with their tapelines measuring the distance from their places of business to the nearest church to see if they came within the 400-foot limit. To-day there are several such places marked "to rent."

PUBLIC BUILDINGS.

The Department of Justice has in hand an appropriation for the erection of a court-house and jail at Juneau and an examiner was sent out to make a report upon matters connected therewith. Perhaps ere this the necessary steps have been taken to begin the work. The people of Juneau have been anxious about this for some time, for since their court-house burned down they have been left to all sorts of makeshifts to provide suitable quarters in which to hold court. In

regard to the public buildings at Sitka, no more can be said than has been reported for the past two years. The buildings are old Russian structures made of great logs. The lower courses have decayed and it is hardly possible to keep the buildings in shape. They have been repaired for years and the use of any further sums for such purposes is really a waste. It is a wonder that the inmates of the jail keep their health, for they are simply hemmed in by decayed timbers. There should be built a proper penitentiary and suitable office buildings, and for this the sum of $110,000 is asked.

LOOKING FORWARD.

Alaska is a land wherein men must eat bread in the sweat of their faces. The thorny apple and the devil clubs are here, and they tear and hurt. Nevertheless the command to "Be fruitful and multiply, and replenish the earth" will be obeyed. This country is capable of supporting a large population. The Anglo-Saxon race, or, better still, the mingled stock that we call American, will thrive here. Such earthly things as gold, silver, copper, platinum, coal, fish, potatoes, and grass have in them a divine propulsion. The forward movement has now begun and nothing can stay it. Within a very few years there will be hosts of busy people here, intelligent and aspiring, bone of our bone and flesh of our flesh. When they send their petitions and knock at the doors of Congress, what are the Eastern statesmen going to say? Will they be bidden to enter, or will they be kept waiting until hope dies? Our Eastern friends should not feel alarmed about the growing importance of Western influences and the preponderance of votes in the halls of legislation. It is inevitable. If we except the time when the Constitution was framed, there has not been a period when wiser statesmanship was needed more than to-day. Now nothing is rigid, but, on the contrary, plastic and ready for the formative touches of the master. Senators and Representatives of the East and South, will you neglect the opportunity?

It is true that Alaska is detached, and this is why we look to you more confidently. Swift steamships, telegraphs, and cables annihilate distance. Probably no people outside of France were more interested and stirred by the Dreyfus case than those here in far-off Alaska. The doctrine that a Territory, and much less a district, can not plead any constitutional rights before Congress appears now to be generally accepted; but Congressmen should remember that the population which is now here and which is coming were brought up in the States. We have had the Constitution preached to us from our childhood, and it is unbearable for us to think that we are to live beyond the pale of its influence and yet be within the boundaries of the United States. Statehood appears to be the only remedy. Alaska is large enough for many States. It might be admitted with definite provisions that as the population advanced within certain areas new States could be created. A people can attain under our form of government to their greatest degree of political happiness under a State and not as a Territory.

Very respectfully,

JOHN G. BRADY,
Governor of Alaska.

The SECRETARY OF THE INTERIOR,
Washington, D. C.

APPENDIX A.

SAN FRANCISCO, *August 31, 1899.*

DEAR SIR: In accordance with the request of your private secretary under date of the 19th instant, we take pleasure in handing you herewith statistics of the salmon pack of the season of 1898 in the Territory of Alaska. It would be impossible to get figures as to the pack of 1899 that would be of any value as statistics, as no definite reports have yet been received. The larger sheet shows the pack as made by our association, and is comparatively correct; the smaller sheet is made up from the best information obtainable, covering the pack for the various other localities and not members of our association.

We take the liberty of calling your attention to some of the figures as shown by the above-mentioned statement.

You will note the value of the tin plate was $326,000, upon which we paid to the United States Government a duty of $52,000.

The registered tonnage of American ships employed by us was 23,178, the greater part of which are the property of the association and necessarily of high class to carry the nature of cargo which we handle. The pack of salmon from other localities must have required about 12,000 tons, making a total of about 35,000 tons, which you will note is considerable of an item for American shipping. In addition to the sail tonnage we employed some 32 steamers, all of which are our property, ranging up to 500 tons register.

Salmon hatchery.—We are pleased to report the enterprise established on Karluk River, Alaska, in the spring of 1896, has proven a great success in the propagation of small fry, as we have demonstrated they are now able to put out about 8,000,000 per year. Owing to the many criticisms that have been made regarding our taking fish from Alaska and leaving no equivalant, we take the liberty of stating a few facts:

We maintain three medical stations—one in Bering Sea, one in Kadiak Island district, and one in Prince William Sound. They are thoroughly equipped and attended by competent doctors, who administer to our employees and natives and at all times free of charge for services or medicines.

We employ at all times such native labor as it is possible to obtain, which we regret to say in many instances is very limited, as they are not inclined to work. Those who do work and turn their fish into the cannery are paid the same price as white labor, and earn from $100 to $150 each, which during the season amounts to about $21,090. We purchased our shooks for salmon boxes from Messrs. Willson & Sylvester at Fort Wrangell, and Hamilton, Simpson & Co., Port Gravima, at an expense of about $11,000.

We paid employees, who comparatively have become permanent residents in Alaska, $76,576; which, with sundry other amounts annually paid, makes a total of money that we distributed through the Territory of Alaska in one season about $123,000.

We make these statements—which, as a matter of course, you are at liberty to use if you see fit—and if you find any omissions or desire any further information which we may have overlooked, kindly command us and same will have our very prompt attention.

Truly, yours,

ALASKA PACKERS' ASSOCIATION,
W. B. BRADFORD, *Secretary.*

Hon. JOHN G. BRADY,
Governor of Alaska, Sitka.

SAN FRANCISCO, *August 30, 1899.*

DEAR MADAM: Answering your inquiry of August 19, the following figures are as precise as information in our possession permits of giving you. There may be some changes in the figures of the 1899 pack, as these figures are what was packed at last reports, and we will not know of these changes for a month yet.

	1898.		1899.	
	Pack.	Number employed.	Pack.	Number employed.
	Cases.		*Cases.*	
Orca, Prince William Sound	23,668	110 whites..	28,110	85 whites.
Kenai, Cook Inlet	16,876	60 whites.. 40 natives.	21,000	50 whites. 50 natives.
Chignik Bay	29,905	85 whites..	28,300	85 whites.
Uyak Bay	30,874	85 whites..	15,000	85 whites.
Hunters Bay	31,133	15 whites.. 95 natives.	30,065	10 whites. 105 natives.
Nushagack	Not operated.		18,300	50 whites.

Gave employment to 250 natives at various times.

Yours, very truly,

EDWIN L. GRIFFITH, *Manager.*

Miss GERTRUDE P. KNAPP,
Private Secretary, Governor J. G. Brady, Sitka, Alaska.

KETCHIKAN, *August 25, 1899.*

DEAR SIR: Your favor of August 19 instant at hand. We do not can any salmon but ship it to the cannery at Loring. We have salted some 800 half barrels of salmon bellies and 200 barrels of red salmon.

Respectfully,

MARTIN & MCKENNON.
B.

Governor BRADY.

SAN FRANCISCO, *August 29, 1899.*

DEAR MADAM: Answering yours of 10th instant, beg to advise president of our company is now at Bristol Bay, or has just started home with a pack, we think, of about 35,000 cases. As far as writer can remember, this season there were about 50 white men and 102 Chinamen, besides a great many natives who are employed each year. Last year pack was 28,000 cases. Expect president back in about three weeks, and although he will be very busy, shall endeavor to have him send the desired information before 1st of October.

Yours, truly,

F. B. PETERSON,
Secretary Naknek Packing Company.

GERTRUDE P. KNAPP,
Private Secretary Governor Brady, Sitka, Alaska.

METLAKAHTLA, ALASKA, *September 2, 1899.*

DEAR SIR: In answer to your inquiries regarding our cannery work, received by our last mail, I beg to say our pack for 1898 consisted of 11,671 cases, and the emyloyees were 3 white men and 200 natives.

This present year our pack consists of 11,850 cases, but we shall before we finish hope to make the pack at least 12,000 cases.

Our employees this year are 1 white man and 193 natives.

Yours, very respectfully,

W. DUNCAN.

Hon. JOHN G. BRADY,
Governor of Alaska.

FORT WRANGELL, *September 27, 1899.*

DEAR SIR: I inclose herewith draft of a bill for the protection of parties engaged in the artificial production of salmon in this district; also a copy of my recommendations to Howard M. Kutchin, special agent of fish and fisheries for Alaska.

We have had some talk on this subject before, on which occasion you expressed yourself as quite in accord with my views on the subject.

In my report to Mr. Kutchin in 1898 I named 2 miles as the distance for protection, which would give me all the protection I require; but with others who have an equal right to protection 5 miles would be required.

Hon. William Sulzer promised to champion the bill. I have sent him a copy of both of these inclosures, also a long letter on the subject. He is a member of Congress from one of the districts of New York City.

Mr. Kutchin will also champion the bill. I have endeavored to make the bill as unobjectionable as possible, and can not really see where any fair-minded man can find fault with it, and feel sure it will have your earnest support. You will see that I have given the Indians free fishing for food purposes, as well as the right with all others to the normal product. I had first drawn the bill excluding the proprietors of hatcheries, as I felt willing to give up all such in my own case, but with others it will be different; in fact would be unjust, virtually making a penalty to the act of propagation. I feel confident this matter will have your conscientious approval.

Yours, truly,

JOHN C. CALBRAITH.

Governor J. G. BRADY.

For the protection of parties engaged in the artificial production of salmon in Alaska by means of hatcheries, a law of Congress should be passed giving such parties property rights to all salmon so produced in excess of the normal output of such stream as the hatcheries may be situated upon, such right to cover all fish, the product of the hatchery, for a distance of 5 miles in all directions from the mouth of such hatchery stream.

The natural product of such hatchery stream, however, or a number of fish of the kind propagated equal thereto, shall always remain free for the use of the native Indian or Indians to whom such stream belongs, according to their own tribal laws—in fact, to all persons; also all other fish, not the product of the hatchery, should be free and exempt from such exclusive right, such property rights of lease that may be granted by the Government to extend for a period of twenty years, subject to renewal at the discretion of the department having control of such matters. The provisions and immunities of such law should also apply to barren streams that may be stocked by artificial means, streams that heretofore produced no salmon by reason of falls between the lake and tide water, over which no fish can pass to ascend to the lakes and spawning grounds above.

A law of this kind could be eliminated of all objectionable features. For instance, all the large, valuable streams that produce 20,000 or more of the valuable fish might be excluded from the provisions of the act. Only the worthless streams, or, as they are called up here, "cultus chucks," might be included.

I do not wish to give this exclusion of the larger streams as a recommendation; but the objection has been made by some of the canners to include the large streams. Certainly the rivers would have to be excluded, as it would be impossible to ascertain their normal output.

I predict that if such a law were passed lakes and streams that are now absolutely barren of salmon would in a few years be producing a food product at a cost greatly reduced from the present that would be counted by millions.

A peculiarity of the valuable red salmon is that they will not take a stream unless it has a lake that they can reach, where they may lay and ripen before ascending the small streams that put into the lake, to spawn. Fully one-half of the small streams have no lakes on them, and fully three-fifths of those that have lakes are barred by falls below the lakes over which fish can not pass; hence the scarcity of this species of fish. The cohoe, dogfish, and humpback, all inferior fish, take any stream on which there are spawning grounds; as a consequence they are very numerous and the red salmon correspondingly scarce.

AN ACT to encourage salmon culture in Alaska and for the protection of parties engaged in the artificial production thereof.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled: Any person or persons who heretofore, or hereafter may establish and maintain a hatchery or hatcheries for the artificial production of salmon in the District of Alaska, shall be entitled to the exclusive right of all fish that such hatchery may produce in excess of the normal product of such stream for a distance of five miles in all directions from the mouth of the stream upon which such hatchery may be located.

SEC. 2. When the average normal product of any stream upon which a hatchery may be maintained shall have taken within five miles of the mouth of said

stream in any one year by any party or parties entitled to fish in the waters of the United States, then the remaining fish produced by said hatchery shall be the property of the owner or owners of said hatchery to a distance of five miles in all directions in salt water from the mouth of said hatchery stream.

SEC. 3. In case other streams producing salmon of the same kind as those produced by the hatchery so protected shall intervene within a distance of five miles, then the normal product of such intervening stream shall be included in and added to the normal products of said hatchery stream, subject to the same conditions as are provided in section 2 of this act.

SEC. 4. The provisions and immunities of this act shall apply to barren streams and lakes that shall have been stocked with fish from artificial hatcheries.

SEC. 5. In case two or more persons shall maintain hatcheries on the same stream, or stock barren lakes or streams, such persons shall be entitled to their proportionate number of adult fish so produced, and each party shall file a sworn statement of his or their output of young fry with the nearest United States commissioner each year.

SEC. 6. Native Indians may at all times take sufficient fish for food or for drying for winter use as food for themselves and families.

SEC. 7. The Secretary of the Treasury is hereby authorized to grant leases in accordance with the foregoing section of this act for the period not to exceed twenty years from the time the product of their hatcheries shall return, to all persons producing satisfactory proof of having maintained hatcheries on any of the streams of Alaska, such lease subject to renewal at the discretion of the Sectary of the Treasury: *Provided*, That before any such lease shall be granted the party or parties making application therefor shall accompany such application with proof sufficient to establish the normal product of such stream or streams.

APPENDIX B.

POST-OFFICE DEPARTMENT,
OFFICE SECOND ASSISTANT POSTMASTER-GENERAL,
Washington, July 11, 1899.

SIR: I have the honor to forward herewith a statement of the mail routes in Alaska in operation at the present time, together with the names of the contractors and the rates of pay, and the intermediate offices supplied, in accordance with your verbal request of last winter.

Route No.	Service.	Intermediate offices.	Period and frequency.	Contractor.	Pay.
78081	Seattle to St. Michael.	.....	3 round trips, June, July, and August, 1899.	Richard Chilcott.	3½ cents a pound.
78082	St. Michael to Nome.	Golovin Bay (n. o.).	2 trips a month, July, August, and September, 1899.	.....do.....	$100 a round trip.
78083	Nushagak (n. o.) to Unalaska.	.....	3 round trips, June to August, 1899.	Alaska Packers Assn., W. B. Bradford, secretary.	$200 a round trip.
78084	San Francisco to Dawson.	Unalaska, St. Michael, Yukon River, and Circle.	3 round trips, June and July, 1899.	Leon Sloss.....	$1,495 a round trip.
78085	Seattle to Dyea	Skagway.....	2 a month.....	Seattle S. S. Co., F. A. Bell, manager.	Gratuitous.
78086	Juneau to Kadiak.	Sitka, Yakutat, Orca, Seldovia, and Tyoonok.	2 a month, April to October, 1899.	M. L. Washburn	$200 a round trip.
78087	Seldovia to Tyoonok.	Kenai.....	.....do.....	Pacific S. S. Co., H. J. Knowles, secretary.	Gratuitous.
78088	Sitka to Unalaska.	Yakutat, Nutchik (n. o.), Orca, Valdez, Seldovia, Kadiak, Karluk, Sandpoint, Unga, and Belkofsky (n. o.).	5 round trips, February, March, November, and December, 1899, January, 1900.	.....do.....	$2,500 a round trip.

Route No.	Service.	Intermediate offices.	Period and frequency.	Contractor.	Pay.
78089	Juneau to Skagway.	Haines and Dyea.	3 a week, November 10, 1898, to November 9, 1899.	E. A. Seeley	$7,800 per annum.
78093	Seattle to Skagway.	Port Townsend, Mary Island, Ketchikan, Fort Wrangell, Juneau.	2 a month, or oftener as boats run	Pacific Coast S.S.Co., John L Howard, vice president.	$18,000.
78094	.....do.....	Mary Island, Metlakahtla, Fort Wrangell, Juneau.	4 a month, July 1, 1899, to June 30, 1900.	Alaska S.S.Co, Chas. E. Peabody, manager.	$50 round trip.
78097	Seattle to Circle and Dawson.	Unalaska, St. Michael, and Yukon River points.	3 round trips, June to August, 1899.	North American Transportation and Trading Co., Michael Cudahy, president.	$1,495 round trip.
78099	Valdez to Nutchik.	Orca	2 a month, April to October, each year	Pacific Steam Whaling Co.	$1,120 a year
78100	Sitka to Unalaska.	Yakutat, Nutchik (n.o.), Seldovia, Kadiak, Karluk, Sand point, Unga, and Belkofsky (n.o.).	1 a month, April to October, each year.	.....do.....	$2,800.
78101	Fort Wrangell to Jackson	Shakan, and Klawock.	20 trips per annum.	.....do.....	$2,400.
78104	Ketchikan to Loring.	.....	2 a month	Peter McKinnon.	$475.
78105	Juneau to Tanana.	Dyea, Sheep Camp, Dawson, Forty Mile, Eagle, Circle, and Rampart.	.....do.....	P. C. Richardson.	$56,000.
78106	St. Michael to Tanana.	Katlik (n. o.), Koserefsky (n. o.), Anvik, Nulato (n. o.), Koyukuk, and Novikatat (n. o.).	1 a month	.....do.....	$23,000.
78109	Valdez to Circle.	Copper Center (n.o.), Slahna (n.o.), Tetling (n.o.), Seward (n. o.), and Eagle.	1 a month.....	Richard Chilcott.	$1,415 a trip.
78110	St. Michaels to Kotzebue, with branch from head of Norton Bay (n.o.) to Golovin Bay (n. o.).	Unalaklik (n.o.), Eaton, and Head of Norton Bay (n.o.)	3 round trips, December, 1899, to May, 1900.	North American Transportation and Trading Co., A. N. Gray, general traffic manager.	$633.35 round trip,
78112	Juneau to Sumdum.	.....	2 a month....	George Harkrader.	$960.

Very respectfully,

W. S. SHALLENBERGER,
Second Assistant Postmaster-Generla.

Hon. JOHN G. BRADY,
Sitka, Alaska.

OFFICE FOURTH ASSISTANT POSTMASTER-GENERAL,
Washington, July 27, 1899.

MY DEAR SIR: At the request of the Second Assistant Postmaster-General, I inclose you a list of the post-offices in Alaska and the compensation of the postmasters. You will notice a good many post-offices where no compensation is

shown. This is where the offices have been recently established, and no salary is shown. Salaries are fixed upon the basis of the business of the office transacted in the previous year, so that no salary appears in offices that were established late last year or during the present year.

With best wishes, I am, very truly, yours,

J. L. BRISTOW,
Fourth Assistant Postmaster-General.

Hon. J. G. BRADY,
Governor of Alaska, Sitka, Alaska.

Post-offices in Alaska July 27, 1899.

Office.	Postmaster.	Salary.
Apollo	Chas. A. Fletcher	
Anvik	J. W. Chapman	
Circle	Chas. Smith	
Chilkat	Sol Ripinsky	$83.00
Douglas	Wm. Stubbins	462.00
Dyea	Clara H. Richards	975.00
Eagle	Thos. McMahon	
Eaton	P. H. J. Leringo	
Fort Wrangell	Clara M. Earhart	251.00
Haines	W. W. Warne	
Homer	S. T. Penberthy	25.00
Jackson	J. L. Gould	73.00
Juneau	R. P. Nelson	1,800.00
Karluk	J. G. Kopp	57.00
Kenai	E. R. Bogert	
Ketchikan	G. W. Clark	88.00
Killisnoo	C. Spahn	53.00
Klawock	A. S. Madleigh	23.00
Kodiak	H. C. Cope	172.00
Koyukuk	F. G. Pickerts	
Loring	J. R. Heckman	46.00
Mary Island	M. S. Weston	218.00
Metlakahtla	Wm. Duncan	37.00
Nome	G. M. Wright	
Orca	O. J. Humphrey	21.00
Peavey	J. D. Kennedy	
Rampart	M. P. Fleischman	
Sand Point	H. B. Scott	11.00
St. Michaels	R. T. Lyng	
Saxman	J. W. Young	
Seldovia	J. W. Smith	
Skagway	W. B. Sampson	1,600.00
Shakan	W. A. Finn	7.00
Sheep Camp	J. G. Brown	
Sitka	P. Archanglesky	976.00
Star	J. C. Hayes	
Sumdum	J. Morello	
Sunrise	H. A. Smith	
Tanana	J. L. Prevost	
Tynonok	I. W. Hanmore	
Udakta	J. Stanley-Brown	
Unalaska	N. Grey	123.00
Unga	P. K. Guild	80.00
Valdez	F. G. Bartlett	
Yakutat	R. W. Beasley	
Yukon	John Hawksley	

APPENDIX C.

JUALIN MINING COMPANY,
Juneau, Alaska, September 22, 1899.

SIR: In compliance with the request of your private secretary on the 15th ultimo, we have the honor to state that since your last annual report we have found a large and well-defined ore body, which we have been developing this summer, working northward toward the property of the Alaska Gold Mining Company, of Indiana, who have recently cut a 6-foot ledge, similar in character to our own in their main crosscut.

The Jualin ledge, which is now being developed, is from 5 to 26 feet thick, and within the last ninety days we have developed enough ore to run our 10-stamp mill for twelve months.

We have been running the mill on development ore exclusively for ninety days, with prospects of being able to continue indefinitely. We are making preparations to run the mill by steam during the three months of winter when the water power may be scant.

Since the completion of our mill and opening of the mine in August, 1896, to September 1, 1899, we have milled 21,889 tons of ore, producing $151,897.14 free gold and $31,764.26 in concentrates, the cost of shipment and treatment of the concentrates, about $8 per ton, being deducted by the smelter, and only net returns shown on the company's books. The average net value of ore milled per ton has therefore been $8.39.

The mine has largely paid for itself and is now on a dividend-paying basis, the first quarterly dividend of $5 per share having been declared August 25, 1899.

Should development work this winter continue in quartz we will erect a larger mill in the spring.

Very respectfully,

H. E. HOGGATT,
Superintendent.

Hon. J. G. BRADY,
Governor of Alaska, Sitka.

APPENDIX D.

NEWSPAPERS.

The Alaskan, published at Sitka, weekly. $2 a year.
Alaska Miner, published at Juneau, weekly. $3 a year.
Mining Record, published at Juneau, weekly. $2 a year.
Dispatch, published at Juneau, daily.
Truth, published at Juneau, weekly.
Daily Alaskan, published at Skagway. 25 cents per week.
Skagway News, weekly. $3 a year.
Skagway-Atlin Budget, daily (evening). $10 a year.
Skagway Weekly Budget. $2.50 a year.
News, published at Douglas Island, weekly. $3 a year.
Stickeen River Journal, published at Fort Wrangell, weekly.
Bennett Sun, published at Lake Bennett, weekly. $5 a year.
Arctic Gold News, Cape Nome.
Cape Nome Gold Digger, Cape Nome.
Nome Nugget, Cape Nome.
Globe, published at Atlin.

APPENDIX E.

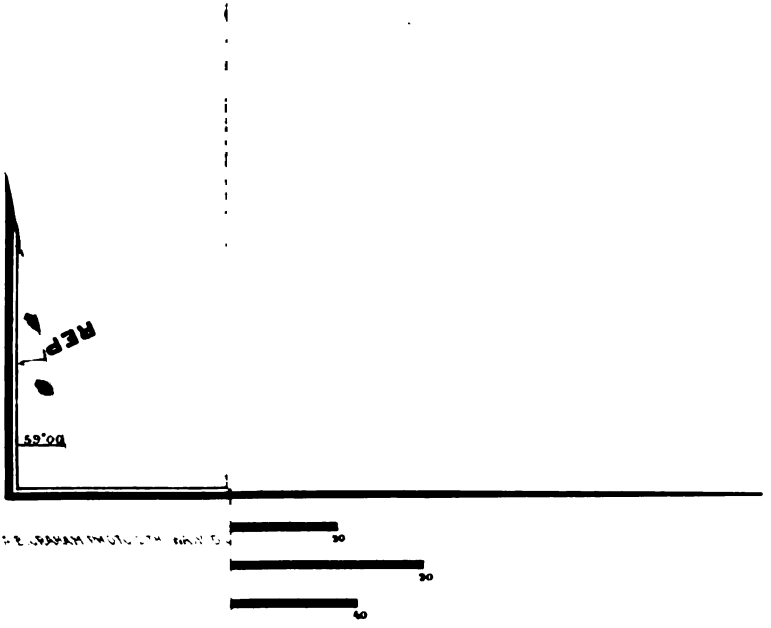
GREAT BRITAIN—ALASKAN BOUNDARY.

Modus vivendi between the United States of America and the United Kingdom of Great Britain and Ireland, fixing a provisional boundary line between the Territory of Alaska and the Dominion of Canada about the head of Lynn Canal.

[Concluded by exchange of notes October 20, 1899, by John Hay, Secretary of State of the United States, and Reginald Tower, chargé d'affaires of Her Britannic Majesty, at Washington.]

It is hereby agreed between the Governments of the United States and of Great Britain that the boundary line between Canada and the Territory of Alaska in the region about the head of Lynn Canal shall be provisionally fixed as follows, without prejudice to the claims of either party in the permanent adjustment of the international boundary:

In the region of the Dalton trail, a line beginning at the peak next of Porcupine Creek, marked on the map No. 10 of the United States Commission, December 31, 1895, and on sheet No. 18 of the British Commission, December 31, 1895, with the number 6500; thence running to the Klehini (or Klaheela) River in the direction of the peak north of that river, marked 5020 on the aforesaid United States map and 5025 on the aforesaid British map; thence following the high or right bank of the said Klehini River to the junction thereof with the Chilkat River, a mile and a half, more or less, north of Klukwan: provided, that persons proceeding



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to or from Porcupine Creek shall be freely permitted to follow the trail between the said creek and the said junction of the rivers into and across the territory on the Canadian side of the temporary line wherever the trail crosses to such side, and, subject to such reasonable regulations for the protection of the revenue as the Canadian Government may prescribe, to carry with them over such part or parts of the trail between the said points as may lie on the Canadian side of the temporary line such goods and articles as they desire, without being required to pay any customs duties on such goods and articles—and from said junction to the summit of the peak east of the Chilkat River, marked on the aforesaid map No. 10 of the United States Commission with the number 5410, and on the map No. 17 of the aforesaid British Commission with the number 5490.

On the Dyea and Skagway trails, the summits of the Chilcoot and White passes.

It is understood, as formerly set forth in communications of the Department of State of the United States, that the citizens or subjects of either power, found by this arrangement within the temporary jurisdiction of the other, shall suffer no diminution of the rights and privileges which they now enjoy.

The Government of the United States will at once appoint an officer or officers in conjunction with an officer or officers to be named by the Government of Her Britannic Majesty, to mark the temporary line agreed upon, by the erection of posts, stakes, or other appropriate temporary marks.

CAPITOL AT PHŒNIX.

REPORT

OF THE

GOVERNOR OF ARIZONA.

EXECUTIVE DEPARTMENT OF ARIZONA,
Phœnix, Ariz., September 1, 1899.

SIR: I have the honor to submit the following report of the affairs, development, and resources of Arizona for the year ended June 30, 1899, in which I have deemed it proper to embrace reliable and exhaustive information upon all subjects material to the industrial, social, and economic progress of the Territory:

POPULATION.

As near as can be estimated from the school census completed in July of this year, Arizona's population exceeds 100,000 people, and it is confidently believed that the general census of 1900 will sustain this estimate.

The probable increase during the year has been 5,000, and, as previously stated, the great and varied resources of Arizona invite strong, courageous characters who come seeking investments and permanent homes. Social and moral conditions here compare favorably with any portion of the Union.

The increase has been distributed very evenly, the mining districts probably receiving the major share, although the agricultural valleys have gained. The nationality of the immigrants can not be reliably determined until after the census is taken, but it is safe to say that a large majority are Americans from all parts of the Union, principally from the north and middle West. Our citizens are industrious, intelligent, patriotic, and brave, such people as make up the bone and sinew of the nation.

TAXABLE PROPERTY.

From the following statement of the taxable property of the Territory, which is compiled from the assessment rolls and the report of the Territorial board of equalization for the current year, it will be seen that the assessed valuation of the property in the Territory has materially advanced during the year, notwithstanding that under the present system a large amount of the taxable property is not returned to the various assessors, and the values of the property assessed are usually very low, which causes a higher rate of taxation than would be necessary were all the taxable property properly assessed and valued. As the community grows older and the disadvantages arising from the present system of low valuations and high rates of taxation are better understood by the people generally, the laws upon the subject will, no doubt, be so altered as to secure approximately full and

correct returns of all property in the Territory subject to taxation. When assessments are had upon a just and equable system of valuation, the rate will be as low here as in any of the States. I have endeavored to present the importance of this subject clearly to the legislative branch of the Territorial government, and it is expected that the commission now engaged in codifying and revising the laws, as authorized by the twentieth legislature, will correct serious faults in the revenue system.

Statement of assessed valuation of property.

County.	Land.	Value.	Value of improvements.	Value of city and town lots.	Value of improvements.
	Acres.				
Apache	784,150	$188,565.89	$89,300.00	$16,999.00	$46,505.50
Coconino	703,605	235,981.31	31,099.00	159,114.50	229,422.50
Cochise	96,895	[1] 148,124.00	152,204.00	27,727.00	344,369.00
Graham	39,710	[1] 599,771.35	650,352.25	54,541.00	102,119.00
Gila	3,002	[1] 169,474.00	128,470.00	66,430.00	136,867.00
Maricopa	251,729	[1] 3,330,267.00	506,673.00	2,464,002.00	1,205,214.00
Mohave	647,396	[1] 201,965.39	114,920.00	46,037.00	
Navajo	1,036,497	[1] 269,658.56	38,267.10	87,463.83	173,540.00
Pinal	55,854	[1] 404,209.50	209,997.00	44,276.50	56,285.00
Pima	74,084	[1] 228,883.00	126,013.00	719,177.00	881,205.00
Santa Cruz	59,227	[1] 77,199.00	17,515.00	63,317.00	170,130.00
Yavapai	362,394	[1] 601,783.51	734,033.00	476,627.50	569,457.00
Yuma	34,519	[1] 76,945.79	83,128.00	63,064.00	73,035.00
Total	4,179,012	6,532,828.30	2,861,971.35	4,288,776.33	3,968,149.00

County.	Horses.		Mules.		Asses.	
	Number.	Value.	Number.	Value.	Number.	Value.
Apache	2,854	$52,082.03	53	$1,350.00	179	$862.00
Coconino	3,520	69,580.00	24	960.00	70	350.00
Cochise	3,919	64,557.00	119	2,975.00	191	1,018.00
Graham	3,698	89,706.88	112	2,872.27	262	2,647.00
Gila	3,101	53,126.00	98	2,450.00	357	1,785.00
Maricopa	4,498	96,040.00	222	5,550.00	45	370.00
Mohave	2,514	75,255.00	14	490.00	85	125.00
Navajo	2,207	42,070.00	61	1,995.00	78	390.00
Pima	4,122	63,482.00	209	5,285.00	23	115.00
Pinal	2,095	29,447.00	112	2,800.00	96	431.00
Santa Cruz	1,933	26,780.00	139	5,060.00	39	274.00
Yavapai	6,489	127,735.00	74	2,105.00	201	1,882.00
Yuma	586	13,161.00	44	1,100.00	13	87.00
Total	41,546	803,021.91	1,281	34,972.27	1,639	10,636.00

County.	Cattle		Sheep		Goats.	
	Number	Value	Number	Value.	Number.	Value.
Apache	8,125	$85,304.00	109,104	$218,208.00	3,001	$6,002.00
Coconino	15,627	164,728.05	164,000	328,000.00	901	1,802.00
Cochise	66,780	671,744.00	6,710	13,420.00	427	854.00
Graham	57,076	578,278.00	1,231	2,462.00	3,883	7,765.00
Gila	40,766	407,660.00	13	26.00	4,411	8,822.00
Maricopa	22,800	288,870.00	7,006	14,012.00	1,305	2,610.00
Mohave	22,347	224,385.00	14,573	29,146.00	800	1,600.00
Navajo	9,220	114,476.15	88,445	176,910.00	530	1,060.00
Pinal	23,213	273,666.00	4,034	8,068.00		
Pima	40,881	412,805.00	2,990	5,980.00	482	964.00
Santa Cruz	14,394	143,727.00	20	40.00	10	20.00
Yavapai	47,665	479,545.00	51,998	103,876.00	3,870	7,640.00
Yuma	962	10,765.00				
Total	369,876	3,855,953.20	450,074	900,148.00	19,620	39,140.00

[1] Also includes value of patented and unpatented mines assessed.

Statement of assessed valuation af property—Continued.

County.	Swine.		All other property.	Railroads.		Total valuation.
	Number.	Value.		Miles.	Valuation.	
Apache	172	$619.00	$185,422.65	54.48	$136,205.00	$1,007,425.07
Coconino	201	1,005.00	370,646.05	123.66	283,650.00	1,876,388.41
Cochise	90	325.00	555,632.20	177.85	991,948.50	2,974,897.70
Graham	579	1,737.00	275,162.73	41.00	128,246.80	2,495,662.28
Gila	377	1,885.00	271,912.00			1,248,907.00
Maricopa	4,369	10,922.50	824,438.09	97.09	563,513.91	9,312,482.50
Mohave	105	368.00	263,252.55	108.076	270,190.00	1,223,063.94
Navajo	247	1,113.00	161,094.55	57.208	143,020.00	1,211,058.19
Pinal	195	585.00	200,918.50	80.29	476,316.64	1,707,000.14
Pima	339	1,017.00	537,189.00	64.75	384,417.40	3,376,512.40
Santa Cruz	81	293.00	237,655.00	52.04	195,976.00	937,986.00
Yavapai	558	1,674.00	1,021,328.85	60.552	103,051.46	4,230,738.32
Yuma	569	1,422.50	77,230.50	82.5	502,539.55	902,478.34
Total	7,883	22,966.00	4,961,882.67	999.496	4,189,075.26	32,509,520.29

According to the foregoing table the Territory has the following assessed taxable property:

4,179,012 acres of taxable land	$6,532,828.30
Improvements thereon	2,861,971.35
City and town lots	4,288,776.33
Improvements thereon	3,988,149.00
41,546 horses	803,021.91
1,281 mules	84,972.27
1,639 asses	10,636.00
369,876 cattle	3,855,953.20
450,074 sheep	900,148.00
19,620 goats	39,140.00
7,883 swine	22,966.00
999.496 miles of railroad[1]	4,189,075.26
All other property	4,981,882.67
Total	32,509,520.29

The average valuation is:

Land, per acre	$1.56
Horses, per head	19.33
Mules, per head	27.30
Cattle, per head	10.43
Goats, per head	2.05
Sheep, per head	2.00
Asses, per head	6.49
Hogs, per head	2.91
Railroad, per mile	4,191.19

[1] There are 454 miles of new railroad in the Territory exempted from taxation for a term of years.

FINANCES.

Statement of the bonded and floating indebtedness of the Territory, June 30, 1899.

Date.	Title.	Time (years).	Rate, per cent.	Amount.
July 1, 1885	Insane asylum bonds	20	7	$74,000.00
November 1, 1885	Wagon road and bridge bonds	15	8	12,000.00
May 15, 1885	Gila bridge bonds	15	8	8,000.00
January 1, 1887	Arizona University bonds	20	7	12,000.00
January 15, 1888	Territorial funding bonds	25	6	140,000.00
July 1, 1892	World's fair bonds	20	5	30,000.00
July 15, 1892	Territorial funding bonds	50	5	2,000,000.00
January 15, 1896	Territorial funding bonds	50	5	300,000.00
June 1, 1898	Capitol building bonds	50	5	100,000.00
Total				2,676,000.00
Deduct county and city indebtedness funded				1,634,027.57
Bonded debt account of Territory				1,041,972.43
Floating debt (general fund warrants)				136,338.44
Total				1,178,310.87
Cash on hand				152,836.90
Less amount paid for interest on old warrants				1,025,473.97 53,719.31
Less amount paid for interest on Yavapai County bonds				971,754.66 23,578.34
Net debt of Territory				948,176.32

Statement of Territorial receipts and disbursements for seven months, January 1 to July 31, 1899.

Cash on hand December 31, 1898		$351,139.98
RECEIPTS.		
Sale of bonds	$31,716.44	
Counties account, tax levy	215,946.18	
Counties and municipalities, account funded debt interest	36,312.15	
Chairman of investigating committees	108.00	
E. J. Bennitt, secretary	790.08	
Insurance tax	5,638.16	
Herbert Brown, superintendent	711.00	
United States Government (agricultural college fund)	25,000.00	
Escheated estate	160.35	
Rent of school lands	912.78	
		317,295.09
		668,435.07
DISBURSEMENTS.		
General fund warrants paid	$94,217.30	
Interest on above	$12,907.68	
General fund warrants funded	84,320.23	
Interest on above funded	24,331.38	
Insane asylum warrants funded	1,121.45	
Interest on above funded	278.31	
Gila bridge bonds funded	7,000.00	
Six per cent funding bonds funded	10,000.00	
Interest on above 6 per cents funded	250.00	
Insane asylum bonds funded	8,000.00	
Interest on above funded	46.64	
Insane asylum bonds paid	8,000.00	
Interest on above	256.64	
University of Arizona bonds paid	2,000.00	
Interest on above	38.90	
Interest on funding bonds	123,975.00	
Interest on bonds other than above mentioned	12,480.00	
Total interest paid		174,564.50

Warrants other than general funds paid	$96,163.63
Expense (mostly bond and warrant calls)	613.74
Total expenditures	$486,000.85
Cash on hand July 31, 1899	182,434.22

NATIONAL AND TERRITORIAL BANKS.

The following comparative tables, showing the increase of business in the banks of Arizona during the three years ended June 30, 1899, are especially interesting and instructive, as they are very significant of the Territory's progress and its remarkable increased strength financially:

NATIONAL BANKS.

Statements made to the Comptroller of the Currency, July 14, 1896.

RESOURCES.

	Loans, discounts, and overdrafts.	Stocks, securities, and claims.	United States bonds and premium.	Cash and due from banks.	United States redemption fund.	Banking house, furniture and fixtures.
Phœnix National Bank, Phœnix	$180,989.15	$39,751.77	$75,000	$60,161.29	$1,125.00	$6,000.00
National Bank of Arizona, Phœnix	156,981.57	15,275.27	25,000	60,652.46	1,125.00	3,500.00
Prescott National Bank, Prescott	201,735.95	20,781.60	27,000	136,721.70	1,225.00	2,200.00
Consolidated National Bank, Tucson	73,855.34	33,082.81	13,500	104,809.21	562.50	3,072.54
Arizona National Bank, Tucson	45,287.77	44,491.96	12,750	122,420.17	562.50	640.00
Total	658,849.78	153,383.38	153,250	484,764.83	4,600.00	15,412.54

LIABILITIES.

	Capital stock.	Surplus and undivided profits.	National-bank notes outstanding.	Deposits.	Total.
Phœnix National Bank, Phœnix	$100,000	$23,448.54	$22,500	$217,078.67	$363,027.21
National Bank of Arizona, Phœnix	100,000	21,321.17	22,500	118,713.13	262,534.30
Prescott National Bank, Prescott	100,000	19,401.07	22,200	248,063.18	389,664.25
Consolidated National Bank, Tucson	50,000	8,484.67	11,250	159,147.73	228,882.40
Arizona National Bank, Tucson	50,000	9,896.61	2,600	163,665.76	226,152.37
Total	400,000	82,542.06	81,050	906,668.47	1,470,260.53

Statements made to the Comptroller of the Currency, June 30, 1899.

RESOURCES.

	Loans, discounts, and overdrafts.	Stocks, securities, and claims.	United States bonds and premium.	Cash and due from banks.	United States redemption fund.	Banking house, furniture and fixtures.
Phœnix National Bank, Phœnix	$477,750.71	$58,764.06	$77,250	$287,705.37	$3,375.00	$4,000.00
National Bank of Arizona, Phœnix	282,138.65	13,276.96	25,000	64,691.17	1,125.00	3,500.00
Prescott National Bank, Prescott	211,578.87	17,575.35	50,000	263,720.57	2,250.00	1,000.00
Consolidated National Bank, Tucson	209,610.24	36,183.17	13,500	443,269.07	562.50	18,859.61
Arizona National Bank, Tucson	92,754.95	27,042.80	13,750	178,997.16	562.50	609.42
Total	1,273,833.42	152,842.31	179,500	1,238,383.34	7,875.00	27,969.03

Statements made to the Comptroller of the Currency, June 30, 1899—Continued.

LIABILITIES.

	Capital stock.	Surplus and undivided profits.	National-bank notes outstanding.	Deposits.	Total.
Phœnix National Bank, Phœnix	$100,000	$49,178.85	$67,500	$692,166.29	$908,845.14
National Bank of Arizona, Phœnix	100,000	36,087.18	22,000	231,694.57	389,781.75
Prescott National Bank, Prescott	100,000	38,204.74	36,650	371,270.05	546,124.79
Consolidated National Bank, Tucson	50,000	8,658.01	11,250	652,076.58	721,984.59
Arizona National Bank, Tucson	50,000	13,251.49	2,900	247,565.34	313,716.83
Total	400,000	145,380.27	140,300	2,194,772.83	2,880,403.10

TERRITORIAL BANKS.

Statements made to the Territorial bank commissioner February 21, 1896.

RESOURCES.

	Loans, discounts, and overdrafts.	Stocks, securities, and claims.	United States bonds.	Real estate, furniture, and fixtures.	Cash and due from banks.
Bank of Arizona, Prescott	$147,017.49	$29,562.53	$60,000	$26,722.50	$58,023.66
Valley Bank, Phœnix	255,340.06	4,350.00	.....	8,755.00	54,037.40
Arizona Central Bank, Flagstaff	75,752.62	19,718.31	.....	2,300.00	25,131.74
International Bank, Nogales	12,668.78	1,035.08	.....	3,261.14	14,886.67
West. Investmt. Banking Co., Phœnix	17,843.09	11,046.35	.....	1,969.00	13,980.84
Farmers and Merchants' Bank, Tempe	76,923.30	2,380.70	.....	1,212.50	38,292.46
Mesa City Bank, Mesa	16,782.54	2,067.91	.....	9,499.75	5,675.78
Total	602,347.88	70,160.88	60,000	53,719.89	210,008.55

LIABILITIES.

	Capital stock.	Surplus and undivided profits.	Deposits.	Total.
Bank of Arizona, Prescott	$50,000	$14,154.70	$257,171.48	$321,326.18
Valley Bank, Phœnix	100,000	27,912.15	194,570.31	322,482.46
Arizona Central Bank, Flagstaff	20,000	10,743.22	92,159.45	122,902.67
International Bank, Nogales	5,000	39.10	26,832.57	31,871.67
West. Investmt. Banking Co., Phœnix	15,200	1,143.79	28,475.49	44,819.28
Farmers and Merchants' Bank, Tempe	25,000	6,569.30	87,239.66	118,808.96
Mesa City Bank, Mesa	20,400	3,589.11	10,036.87	34,025.98
Total	235,600	64,151.37	696,485.83	996,237.20

Statements made to the Territorial bank commissioner June 30, 1899.

RESOURCES.

	Loans, discounts, and overdrafts.	Stocks, securities, and claims.	United States bonds.	Real estate, furniture, and fixtures.	Cash and due from banks.
Bank of Arizona, Prescott	$213,015.65	$6,304.69	$75,000	$36,000.00	$249,206.94
Valley Bank, Phœnix	350,952.37	40,447.33	.....	22,570.07	113,071.76
Arizona Central Bank, Flagstaff	194,155.51	6,991.15	.....	3,810.00	77,373.09
International Bank, Nogales	40,822.95	2,095.15	.....	4,457.57	35,966.62
West. Investmt. Banking Co., Phœnix	16,824.91	.....	.....	.....	7,412.85
Farmers and Merchants' Bank, Tempe	80,049.45	2,050.60	.....	4,261.00	23,182.95
Mesa City Bank, Mesa	21,180.20	3,056.34	.....	4,752.75	8,063.89
Total	917,001.04	60,945.26	75,000	75,851.39	514,278.10

Statements made to the Territorial bank commissioner June 30, 1899—Continued.

LIABILITIES.

	Capital stock.	Surplus and undivided profits.	Deposits.	Total.
Bank of Arizona, Prescott	$50,000	$15,000.00	$514,527.28	$579,527.28
Valley Bank, Phœnix	100,000	26,953.83	400,087.70	527,041.53
Arizona Central Bank, Flagstaff	20,000	10,500.38	251,829.37	282,329.75
International Bank, Nogales	15,000	3,551.95	64,790.34	83,342.29
West. Investmt. Banking Co., Phœnix	300	105.61	23,832.15	24,237.76
Farmers and Merchants' Bank, Tempe	24,000	2,667.90	82,876.10	109,544.00
Mesa City Bank, Mesa	10,400	121.06	26,532.12	37,053.18
Total	219,700	58,900.73	1,364,475.06	1,643,075.79

CUSTOMS.

Following is a statement by the collector of customs, port of Nogales, of the business of the district of Arizona for the current year:

Statement of imports into the district of Arizona during the fiscal years ending June 30, 1898, and June 30, 1899, respectively.

CONSUMPTION.

When imported.	Free.	Dutiable.	Total imports.	Duties collected.
1898.				
July	$200,445	$6,745.00	$207,190.00	$2,496.41
August	176,931	11,069.00	188,000.00	3,656.88
September	210,317	2,253.00	212,570.00	1,061.28
October	184,698	6,606.00	191,304.00	2,178.14
November	242,547	48,665.00	291,212.00	31,180.76
December	325,835	70,674.00	396,509.00	36,104.73
1899.				
January	295,877	5,962.00	301,839.00	2,093.43
February	193,259	15,969.00	209,228.00	5,775.93
March	225,730	18,822.00	244,552.00	6,551.47
April	243,914	10,179.00	254,093.00	3,766.05
May	228,491	71,808.00	300,299.00	24,045.13
June	325,106	21,985.00	347,091.00	7,686.51
Total 1898-99	2,853,150	290,737.00	3,143,887.00	126,566.72
Total 1897-98	3,432,230	282,734.35	3,714,964.35	138,965.48
Decrease	579,080		571,077.35	12,398.76
Increase		8,002.65		
Additional duties pertaining to 1898-99				1,320.64
Total decrease in duties collected				11,078.12

Warehouse and immediate transportation.

When imported.	Values.	Duties.
1898.		
July	$99,571	$38,780.59
August	188,913	43,073.57
September	217,123	48,037.80
October	270,062	59,811.95
November	220,470	52,886.88
December	99,524	22,127.80
1899.		
January	99,259	16,185.76
February	37,525	11,408.39
March	62,963	19,999.86
April	50,996	15,138.00
May	52,318	13,213.91
June	58,893	16,160.23
Total 1898-99	1,392,637	356,824.74
Total 1897-98	803,728	245,702.13
Increase	588,909	111,122.61

Number of cattle imported, free and dutiable, with value of dutiable.

Year ending June 30—	Dutiable.	Free.	Value of dutiable.
1899	18,937	903	$167,244
1898	32,231	6,428	212,422
Decrease	13,294	5,525	45,178

Duties levied and collected on cattle.

Year.	Number of head.	Duties collected.	Average duty per head.
1898-99	18,937	$61,664.73	$3.25
1897-98	32,231	93,227.52	2.89

Exports.

Year.	Total value.
1898-99	$1,518,980
1897-98	1,188,381
Increase	330,599

Comparative statement of percentage of dutiable and free importations for consumption, and the average rate of duty collected on dutiable merchandise.

Year.	Imports.	Dutiable.	Free of duty.	Average rate of duty collected.
		Per cent.	*Per cent.*	*Per cent.*
1897-98	$3,714,964.35	7¼	92¾	48.7
1898-99	3,143,887.00	9½	90½	43.5

SETTLEMENT OF LANDS.

The following statements from the land offices at Tucson and Prescott show the amount of land taken up in the Territory during the past year, giving amount of land covered by original and final entries:

Transactions for fiscal year ending June 30, 1899, in the United States land office at Tucson.

Class of entry.	Entries.	Acres.
Original homestead entries	240	31.712 41
Final homestead entries	73	9,205.67
Original desert-land entries	51	6,945 54
Final desert-land entries	20	4,235.29
Cash entries	35	2,304.57
Final timber-culture entries	5	800
Land-warrant entries	2	320
Lieu-land entries	44	4,154.66
Mineral entries	19	1,060.5794
Total	489	60,536.7194

During the fiscal year 162,850.74 acres of public land were surveyed (not including reservations).

One hundred and sixty-two lode claims and 4 mill sites were surveyed in this district for patent during the fiscal year.

Transactions for the fiscal year ending June 30, 1899, in the United States land office at Prescott.

Class of entry.	Entries.	Acres.
Sales of mineral lands	29	1,877
Sales of lands under act of August 23, 1894	6	399.57
Homestead entries commuted to cash under section 2301, Revised Statutes	9	1,355.33
Original homestead entries	70	9,908.72
Final homestead entries	39	5,519.67
Original mineral applications	26	999
Original desert-land applications	10	2,041 39
Final desert-land entries	1	240
Total	190	22,430.68

Statement showing the status of the lands in the Territory, as compiled from the records of the United States land offices.

County.	Surveyed.	Unsurveyed.	Total.	Appropriated.	Reserved vacant.	Total.
	Acres.	*Acres.*	*Acres.*	*Acres*	*Acres.*	*Acres.*
Apache	1,053,263	708,166	1,761,429	1,222,900	4,182,866	7,170,000
Cochise	1,391,941	2,196,671	3,588,612	258,311	135,077	3,982,000
Coconino	614 781	8,488,205	9,102,986	699,469	3,427,545	13,230,000
Gila	83,166	1,687,530	1,770,696	34,870	1,123,934	2,929,500
Graham	775,705	2,096,924	2,872,629	255,371	1,010,000	4,138,000
Maricopa	1,333,639	3,900,418	5,234,057	626,903	193,040	6,054,000
Mohave	984,099	5,721,942	6,706,041	45,959	383,000	7.136,000
Navajo	1,270,085	633,000	1,903,085	1,011,095	3,465,820	6 380.000
Pima	866,797	4,535,604	5,402,401	439,885	91 414	5 933,700
Pinal	810,050	2,126,315	2,936,373	242,157	295,970	3,474,500
Santa Cruz	.....	450,428	691,801	22,499	66,000	780,300
Yavapai	856,233	3,718,182	4,574,415	498,455	184,130	5,257,000
Yuma	617,825	5,063,291	5,681,116	334,784	311,000	6,327,500
Total	10,898,865	24,326,776	52,225,641	5,696,478	14,871,366	72,792,500

As will be seen from the foregoing table, there are 24,326,776 acres of unsurveyed land in the Territory. It is very important that these lands be surveyed, especially the unsurveyed railroad-grant lands, so that they may be assessed for taxation. Considerable revenue would accrue to some of the northern counties if these lands could be taxed.

COMMERCE AND RAILROADS.

The traffic of the railroads of the Territory has materially increased during the past year, and there is every indication of a continued increase. They are continually demonstrating their confidence in the development of the Territory by making many improvements to their property of a permanent character.

During the year the Santa Fe and Grand Canyon Railway Company has actively commenced construction of a standard-gauge road from Williams, on the Santa Fe Pacific Railroad, to the Grand Canyon of the Colorado, a distance of 64 miles, and it is expected that it will be completed and in operation by January 1, 1900. It is stated that the construction of this road will materially assist in the development of mining properties, and will afford rapid transportation of tourists to the Grand Canyon of the Colorado, the wonders of which are so well known.

The Arizona and Utah Railway Company has constructed and has in operation a road from McConnico Junction, near Kingman, on the

Santa Fe Pacific Railroad, to Chloride, in Mohave County, a distance of 23 miles, and it has in contemplation an extension to the White Hills mining district, a distance of about 40 miles, and later to Utah. The road as now constructed provides transportation facilities for the gold and silver mines of the Chloride district, and farther extension will supply the mines of northwest Arizona with facilities much needed.

It brings direct rail transportation to the rich and prolific mining camps of Chloride, Mineral Park, Todd Basin, Union Basin, Cerbat, White Hills, etc., all sections abounding with strong veins of lead, silver, gold, and copper, and destined to become, under the stimulus of improved facilities, one of the greatest mining districts of the West. These are not new and untried camps. Their values have been proven for many years, and large development has only awaited the advent of the railroad.

The Santa Fe, Prescott and Phœnix Railway Company contemplates the construction, in the near future, of a branch line northwest of Hot Springs Junction, in Maricopa County, to Castle Creek Hot Springs, in Yavapai County, and to the mining districts in that section, which have recently developed sufficiently to attract the attention of that company.

The Prescott and Eastern Railroad Company has in contemplation the construction of other branches to further serve and develop other meritorious mineral sections.

A company has been incorporated to construct a road from Phœnix to Globe, in Gila County.

The roads now in operation in the Territory are as follows:

	Gauge.	Miles
Southern Pacific of Arizona, extending along the southern part of the Territory from Yuma, on the Colorado River, to the eastern boundary of Cochise County, passing through the counties of Yuma, Maricopa, Pinal, Pima, and Cochise	4.8½	383
Santa Fe Pacific, crossing north of the center of the Territory, near the thirty-fifth parallel, and passing through the counties of Apache, Navajo, Coconino, Yavapai, and Mohave	4.8½	393
Santa Fe, Prescott and Phœnix, running from Ash Fork, on the line of the Santa Fe Pacific, through the counties of Yavapai and Maricopa to Phœnix	4.8½	197
Gila Valley, Globe and Northern, running from Bowie, on the Southern Pacific, in Cochise County, to Globe, Gila County	4.8½	140
New Mexico and Arizona, running from Benson, on the Southern Pacific, in Cochise County, to Nogales, in the same county, at the Mexican line	4.8½	87
Arizona and New Mexico, running from Clifton, in Graham County, to the Southern Pacific at Lordsburg, N. Mex	3	71
Arizona and Southeastern, running from Bisbee, Cochise County, to Benson, on the Southern Pacific, in the same county	4.8½	54
Maricopa and Phœnix and Salt River Valley, running from Maricopa, Pinal County, on the Southern Pacific, to Phœnix, Maricopa County, with a branch from Tempe, Maricopa County, to Mesa, in the same county	4.8½	43
Prescott and Eastern, running from a point on the Santa Fe, Prescott and Phœnix, Yavapai County, to Mayer, in the same county	4.8½	27
United Verde and Pacific, running from Jerome Junction, on line of Santa Fe, Prescott and Phœnix Railway, to Jerome, Yavapai County	3	26
Congress Gold Company, running from Congress Junction, on Santa Fe, Prescott and Phœnix, in Yavapai County, to the Congress Mine	4.8½	4
Arizona and Utah, running from McConnico Junction, on the Santa Fe Pacific, in Mohave County, to Chloride, in the same county	4.8½	23
Total		1,452

Railroads are also projected from Morenci, Graham County, to Guthrie, same county, 18 miles, and from Helvetia Camp, Santa Rita Mountains, to Tucson, Pima County, 35 miles.

TAXATION OF THE SANTA FE PACIFIC RAILROAD (FORMERLY ATLANTIC AND PACIFIC).

Under the act of Congress of July 27, 1866 (c. 278, 14 Stat., 292, 294), it is claimed that the exemption from taxation in the Territories of the United States of the right of way of the Atlantic and Pacific Railroad Company included the track, land, and structures thereon within the right of way.

The questions involved have been contested until the Supreme Court of the United States has decided in favor of the railroad company and holds that the track, land, and superstructures thereon are not taxable within the meaning of the law. (United States Reports, vol. 172, p. 171.) Ever since the completion of the railroad, in 1883, until the decision of the Supreme Court, in 1898, fifteen years, taxes have been paid by this railroad company upon varying valuations per mile, under compromise agreements with the counties through which the road passes (latterly upon a valuation of $5,000 per mile). To cut this source of revenue off altogether is very severe upon the counties of Apache, Navajo, Coconino, Yavapai, and Mohave, comprising the northern tier of counties of the Territory. It compels a readjustment of assessed values upon other property and is felt to be a hardship by the people.

It is contended that when Congress granted the franchise the present developed condition of the Territory was not anticipated, and it assumed that the exemption only covered a barren and unoccupied country, which was the case when the act of 1866 was passed.

Section 20 of the act of July 27, 1866, closes with the words:

> Congress may, at any time, having due regard for the rights of said Atlantic and Pacific Railroad Company, add to, alter, amend, or repeal this act.

Amendment by Congress of the act in question so as to make the track and superstructure within the right of way taxable would be of great benefit to Arizona. The railroad company has shown a commendable desire to meet the question fairly, but unless Congress affords relief in the manner suggested full taxation of this property can not be secured until Arizona is admitted as a State.

STOCK RAISING.

Of the four great industries of Arizona—mining, agriculture, horticulture, and stock raising—the latter continues to hold second place on the assessment rolls, with an aggregate valuation for this year of $5,666,837.38. These figures fail to convey a proper idea of the magnitude of the industry. The official figures of 369,876 cattle, 450,074 sheep, 41,546 horses, 1,281 mules, 1,639 asses, 19,620 goats, and 7,882 swine, fall very far short of representing the actual number. This is especially true of cattle and sheep, and it is doubtful if the assessors' returns give more than 50 per cent of the real number.

As in all other branches of business, the past year has been a prosperous one for the grazers. Prices have been well maintained. The rains on the open ranges were unusually copious in July and were fairly well distributed during the succeeding months. There has been range feed for a much greater quantity of stock than in former years. Shipments of cattle to Kansas for fattening continues to be an important feature of the industry. The shipment of beeves ready for market to California, Denver, Kansas City, and Chicago from the alfalfa fields of the valleys has grown to be a business of

large proportions. It has been demonstrated beyond question that the bringing of range cattle to the valleys for fattening on the growing alfalfa is a decided success. The beef so produced is excellent. The business is profitable alike to the cattle owner and to the alfalfa grower.

The policy of improving the grades of live stock by importing the best blooded animals for breeding purposes has proven very profitable, and the operation of large alfalfa farms for the breeding and fattening of calves is becoming a popular and money-making business in the southern valleys.

The climatic conditions are always favorable to stock raising in Arizona. Cold and blizzards and deep snows are never a menace to the prosperity of the stockmen here, and the greater portion of the ranges is open every day in the year.

The raising of high-bred horses in the Salt River Valley is an industry that has a promising future. Enough progress has been made to prove the excellence of the locality for all the requirements of the business. But outside of this branch the raising of horses has ceased to be profitable. There are still thousands of horses on the ranges, but usually they are of the small and hardy Western variety, used principally for riding by cowboys. They are not in great demand and their value is inconsiderable.

In hogs Arizona has a great field for development. The hog raisers of the Salt River Valley and other farming regions of the Territory have found that the general conditions are exceedingly favorable. Hogs raised and fattened in the alfalfa fields and hardened with barley are shipped out in increasing numbers each year, and already the main supply of pork for southern California is furnished by Arizona.

Perhaps no other line of live-stock industry has been so profitable to stockmen of small means as have sheep. They require more experience in handling, but the returns to those in the wool-growing business have been exceedingly satisfactory.

One of the most vexatious problems connected with the cattle and sheep business is that of satisfactorily dividing the ranges between the cattle and sheep men. There is a constant conflict of interest between the owners of cattle and the owners of sheep, on account of there being no authoritative method of limiting the respective ranges on the public domain. No improvement can be expected in this respect until some systematic mode of controlling the open ranges has been devised and adopted. The question under present conditions frequently proves a serious menace to law and order. There are some 30,000,000 acres of grazing lands in the Territory, and the problem would be solved very quickly, and permanent harmony established between these two branches of the grazing industry, if a system of leasing the ranges were adopted. A cession of all the public lands to the Territory would enable the Territorial government to formulate and carry out a system of leasing. Such a system would not only be satisfactory to the stockmen, but it would yield a substantial revenue to the Territorial treasury. And since the grazing lands are a source of no revenue to the Government, the same argument applies to them that is urged in favor of the proposition of ceding the irrigable lands. Unquestionably it will become necessary at no distant day for the Government to adopt such regulations as will properly control grazing on the public domain and protect the equitable rights of both sheep and cattle men.

AGRICULTURE AND HORTICULTURE.

The wisdom of maintaining an agricultural experiment station in connection with and under the auspices of the Territorial university has been fully demonstrated. The scope of the station's work grows wider each year, and with it is seen an added efficiency. The bulletins issued from time to time are widely circulated, and have an added value from the fact that the agriculturists of the Territory manifest a keen interest in all the subjects treated. The intellectual average of the farming population of Arizona is exceptionally high, and in such a community such work as is being done by the experiment station can not fail of intelligent criticism and good results.

The following report from the director of the station for the current year is submitted as giving a fair résumé of the conclusions which have been reached:

One of the most encouraging signs of the times in connection with Arizona is the growth of her agricultural interests. These interests, by creating a settled population and certain sources of wealth, insure the Territory, as a whole, against those excessive fluctuations in population and finance which are so often observed in purely mining communities. Although but a small percentage of the total area of Arizona is under cultivation, yet when the actual amount and productiveness of these lands is considered, the place of agriculture among the industries of the Territory is very important. Arizona has and always will have land in excess of the water supply available for irrigation, without which agriculture can, excepting in rare instances, hardly be considered. Out of about 72,800,000 acres in the Territory only 5,700,000 acres are privately owned, of which about 450,000 acres are under irrigation ditches. For the total amount of land under ditch, there is not sufficient water in all instances to insure crops; but in time there can be little doubt that the storage and development of water will lead to the successful irrigation of much more than the area under ditch.

The future of agriculture in Arizona is, without question, more than usually good, and for the reason that the conditions of soil, irrigation, and climate combine to produce an uncommon variety and amount of marketable produce. The soil of Arizona, as is usual with the soils of arid regions, are rich in the elements of fertility, requiring only the ever-needful water, skill, and industry in their management to secure abundant returns. The fertility of cultivated soils in irrigated regions is further assured by the deposit of silt brought upon the land with irrigation water. The problems of fertilization, which become so serious in humid sections, are therefore of much less importance here and not to be so carefully reckoned with in connection with the future of our agriculture.

The most marked advantage in connection with agriculture and horticulture, especially in southern Arizona, is the climate. From January to June the temperature resembles that of spring and early summer in the latitude of Kentucky. From June to September the climate is of subtropical fervor, while from September to November there is a second mild season of temperate weather. The winter season, from November to January, though subject to sharp frosts in southern Arizona, is not seriously or even uncomfortably cold.

Owing to this combination of seasons a remarkable variety of crops may be found in the same locality at different times of the year. Strawberries, which flourish in Greenland, may be found on the same land with dates and palms from Sahara. Alfalfa, the great forage of the arid West, flourishes alongside with wheat, corn, and sorghum, respectively characteristic of Minnesota, Illinois, and Kansas. Oranges, lemons, and olives from California may be found in the same neighborhood with peanuts and sweet potatoes from Virginia. In brief, many of the leading crops of both temperate and subtropical countries, which are not affected by a too arid atmosphere or by the frosts of winter, flourish in southern Arizona. In northern Arizona, where the temperatures more resemble those of northern Illinois, many of the more distinctively temperate-region crops flourish, such as potatoes, apples, and various small fruits.

When, with this diversity of products is coupled a healthful, and for the most of the year agreeable, climate, it will be seen that agriculture in Arizona possesses distinct advantages.

STAPLE CROPS.

ALFALFA.

Probably the most important crop in Arizona is alfalfa. With at least five cuttings a year possible, it may be stated that probably nowhere in the United States does this plant yield more abundantly.

It has several values in our agriculture. First, as hay there is a constant market at good prices in the adjoining mining country. During the past two years the short crop in California, with resulting high prices, has led to an annual output of hay from Arizona. This fact, among other things, illustrates the advantage of an irrigated region over one depending for crops upon rainfall. A more profitable use for alfalfa ordinarily is as a stock fattener. It is so employed in feeding hogs and cattle; also, in connection with a growing dairy industry. It is estimated that during 1898 about 35,000 head of cattle fattened on alfalfa were shipped from Salt River Valley. With improved methods of feeding, this output can doubtless be greatly increased.

With butter now being shipped into Arizona from Kansas, it is also evident that there is yet room for the growth of the dairy industry. There are now three creameries and cheese factories in the Territory, with probably more to come in the near future.

Another very important use of alfalfa is a soil renovator. Our semiarid desert soils are commonly dense and deficient in humus and nitrogen—circumstances leading to a condition of poor tilth, which often makes successful culture of ordinary crops a difficult matter. Alfalfa, however, flourishes in these soils, and in so doing loosens them to considerable depths by means of its roots; and through its process of growth and decay, contributes the much-desired humus and nitrogen to the soil. In this way alfalfa serves as a preparation for other crops; and it is a matter of common observation that orchards, wheat, sugar beets, and other crops all flourish best on ground which has previously been in alfalfa.

CORN.

It is only within the past few years that it has been known that fine crops of corn may be grown in the warmer regions of Arizona. Large crops of this product are annually grown on the upper Gila, in Graham County, and the acreage in Maricopa County is annually increasing. In order that the grain may properly fill, corn must be planted in July, or sufficiently late, so that in maturing it will just escape the fall frosts. The poor varieties of Mexican corn formerly grown in Arizona are giving way to the improved white Dent varieties from the north and east. Our seasons are sufficiently long to grow a crop of corn after harvesting a crop of wheat or barley.

In connection with alfalfa, and together with other forages of like nature, corn will probably prove more valuable in helping to make out a more perfect ration for cattle. Sorghum, root crops, and Kaffir corn are likely to prove valuable for the same purpose.

WHEAT.

The acreage and amount of wheat produced in Arizona is increasing each year. It is largely a winter and spring crop, maturing before the extremely dry weather of summer, when water is scarce. Large flourishing mills at Phenix, Tempe, Tucson, Solomonville, and Safford, are supplied by Arizona grown wheat. The chief variety cultivated heretofore has been the Sonora wheat, but there is room for useful experiment in securing other successful varieties for Arizona, in order to obtain a better milling combination than is afforded by the Sonora wheat alone. A number of experimental plots containing the most promising foreign varieties have been grown this year at the experiment farm near Phenix, yielding promising results in some cases. The average yield in the principal wheat-growing sections of the Territory is stated to be from 20 to 30 bushels per acre.

BARLEY.

Barley is chiefly grown in Arizona as a hay crop, being cut and baled for this purpose before maturity. Certain varieties of beardless and hull-less barley have recently been introduced in a few places, and are attracting some attention. The yield of grain per acre is stated to be from 30 to 50 bushels.

CATTLE AND ALFALFA.

YOUNG ORANGE GROVE, SALT RIVER VALLEY.

OATS.

Oats are grown chiefly in the small valleys of northern Arizona, where this crop is of considerable importance. In some places the oats are also cut before maturity and converted into hay.

Root Crops and Vegetables.

Many of the most important root crops thrive in Arizona. The common potato grows wild in certain parts of the Territory. In the northern valleys, where irrigation is possible, heavy crops of potatoes are grown. During the long mild spring season potatoes may also be grown with marked success in the irrigated portions of southern Arizona. The chief difficulty in southern Arizona, however, is to preserve the potatoes after they are once grown, since in this warm section their tendency is to sprout and continue their growth shortly after maturity.

Sweet potatoes of excellent quality and in great quantity can be grown. Peanuts have also produced well, although their culture has as yet hardly passed the experimental stage.

Sugar beets and field beets yield abundantly if planted early enough in the year to mature before the extremely hot weather of midsummer.

Garden vegetables in unusual variety may be produced if skillful attention is paid to the planting season. As mentioned above, there are two mild, temperate seasons in southern Arizona—one extending from January to June, the other from September well into November. Certain of the more quickly growing vegetables, therefore, may be made to produce both in the spring and fall, this double season being recognized by the more experienced residents of this section. Among the vegetables most successfully grown are watermelons, which ripen about the 1st of July, and constitute a profitable crop in some sections of the Territory. Other vegetables which will succeed in northern Arizona are cabbages, peas, onions, cauliflowers, and various others which are gradually being added to the list from time to time as the methods of culture are becoming better understood.

Fruits.

In northern Arizona, where the climate is temperate in character, peaches, grapes, and apples of superior quality are grown, but only in small quantities, since the irrigated area in northern Arizona is only limited in extent. Apricots and grapes are grown and shipped in large quantities from Salt River Valley. Raisins are also produced in considerable amount in this part of Arizona. Oranges and lemons of superior quality are produced in Salt River Valley. They have the advantage of a season earlier than that of southern California, while in addition the fruit is uncommonly bright and attractive in appearance. This is due to the fact that the scale insects perish from the effects of the dry, hot atmosphere, leaving the fruit unmarred by their presence. In certain favored situations protected from frost lemons have proved a success in Salt River Valley, and are said to be also a promising crop in the vicinity of Yuma. Strawberries in skillful hands have proved a profitable crop in Salt River Valley, the entire product thus finding a ready market in Arizona. Figs grow luxuriantly in southern Arizona, but require a constant and abundant supply of water in order to yield well. Almonds have been grown with varying success in southern Arizona. The great drawback of their culture is the late spring frosts, which are so likely to destroy the crop. For the past two years, however, the growers have in some instances succeeded in warding off the disastrous frosts by smudging their orchards at critical times. During this time valuable crops have been secured, especially in the vicinity of Mesa City.

Olives are a promising crop in southern Arizona. This tree requires comparatively little water, and the scale, which is so abundant upon the tree in California, is not found upon it in Arizona. Experts state that the trees grown in Arizona are unusually bright and attractive in appearance and their fruit of good quality. The product of the olive tree also, either in the form of pickles or oil, may be held for the best market and is of small weight and bulk in comparison with its value, shipping charges being thus economized. It is not improbable that this fruit has a growing future in Arizona, since the demand for olive products is at present, throughout the United States, far in excess of the supply.

NEW CROPS.

SUGAR BEETS.

The experiment station has continued its work with sugar beets during the past year with fair success. The following is a table of the results obtained thus far:

Sugar beets from Phœnix experiment station farm.

Variety.	When sown.	Harvested.	Irrigation.	Weight.	Yield per acre.	Sugar in juice.	Purity of juice.
				Ounces.	*Tons.*		
Kleinwanzlebener	Sept. 27, 1898	Mar. 31, 1899	.....	9	7.9	12.13	79.3
Do	Jan. 18, 1899	June 12, 1899	.....	11.4	11.5	13.5	79.2
Do	do	June 26, 1899	3	13.2	14.6	13.4	82.4
Vilmorin	Feb. 13, 1899	do	1	6	5.5	15	79.5
Do	do	do	2	5.4	4.8	16.5	88.4
Kleinwanzlebener	do	do	2	7.7	7.3	13.2	77.5
Do	Feb. 25, 1899	do	1	7.3	7.2	16	81.9
Do	do	do	1	8.6	8.8	15.45	79.9
Do	do	do	1	8.6	8.8	5.7	83.4
Do	Feb. 7, 1899	June 27, 1899	2	8.4	10.9	13.6	84.9
Do	.....	do	3	10	10.4	11.9	79.5

The leading precautions observed in this work have been, first, to plant early in the year so that the beets could mature before the extremely warm weather of midsummer; second, to conduct the experiment on a sufficiently large scale to avoid the well-known loss of sugar and purity observed in small plantings; third, to give the growing crop the best and most skillful attention in connection with culture and irrigation. It will be noticed by the table that in many cases but one, but in no case more than three, irrigations were made. The results, however, show that, even with only one irrigation, some of the plots produce as much as 8.8 tons per acre. In comparison with the usual expense of water in raising crops in Arizona this is certainly a remarkable showing, and suggests what skillful culture may be made to accomplish in economizing irrigation water.

This year, at last, the Kleinwanzlebener beet has done better than the Vilmorin in southern Arizona. The year's experience, taken in connection with that of beet growers in California, also shows the advantage of an irrigated region over one depending for crops upon rainfall. The factories of California last year, on account of the drought for the past two years, were able to run but a fraction of their usual working time, while the factory at Lehi, in Utah, which depends upon irrigated beets, has prospered during the past season. It is hoped that the results with beets in southern Arizona may lead investors to make the most of the latter advantage and establish a factory in Arizona.

CANAIGRE.

At present little more can be said concerning canaigre than that it is an attractive proposition. Tannic acid, upon which the leather industry depends, is obtained chiefly from the barks and woods of various kinds of trees, especially chestnut, oak, hemlock, and quebracho, and others. Should the forests, however, affording this supply be once destroyed, it would require many years to restore the supply of tanning materials. Canaigre, however, is a crop which may be matured in from one to three or four years, according to circumstances, so that it promises to afford a means by which tannic acid may be agriculturally produced, as are many other staples. The green root contains from 8 to 12 per cent of tannic acid, which is from 25 to 35 per cent in the dry material. The plant is a winter grower, and on this account, possibly, has a future in the irrigation of great areas in the arid Southwest hitherto unreclaimed.

Although many prominent tanners have stated that canaigre is capable of producing excellent grades of leather, and although various concerns have been engaged during the past six or seven years in the culture of canaigre and the manufacture of extracts, it can hardly be said as yet that definite agricultural results have been obtained. This fact, however, does not necessarily reflect upon the merits of the article, which, with good management and favoring conditions, may yet win a place among standard tanning materials.

VIEW OF YARDS, SAWMILL, AND BOX FACTORY OF SAGINAW LUMBER COMPANY, WILLIAMS. MONTHLY PRODUCT 2,500,000 FEET SAWED LUMBER.

DATE PALMS.

Bulletin No. 30, of the Arizona agricultural experiment station, by J. W. Toumey, published June, 1898, attracted general attention to the date culture in the arid Southwest, especially in Arizona. Following up his study for this subject, Mr. Toumey went to Washington some months after publishing his work and interviewed the Secretary of Agriculture for the purpose of obtaining an appropriation which should be especially devoted to the importation of the best varieties of palms from the Old World. The varieties at present growing in Arizona are largely seedlings and consequently in most cases are of inferior quality. In the Old World, however, through centuries of culture and selection, the very best possibilities of the tree have been realized. The quickest way, therefore, to reap the benefits of date culture in Arizona is to import these long-established and well-tried varieties from Arabia, Egypt, Algiers, and elsewhere, and set them to growing in this locality. A suitable tract of land was secured 3 miles south of Tempe, Ariz., through the public spirit and generosity of Mr. John Jungermann, and title conveyed to the station for the same, on condition that it should be devoted to the culture of date palms. This experimental tract comprises 15 acres, having room for nearly 2,000 palms. It has already been partly planted with male trees from the adjoining localities, while the first shipment of foreign palms is now on the road. In view of the natural advantages possessed by southern Arizona for palm culture and the generosity of the Secretary of Agriculture in furthering this project, it may be stated that the outlook for date-palm culture in Arizona is very satisfactory.

VARIOUS OTHER NEW CROPS.

The value of various other crops is being tried from time to time through private enterprise and at the experiment station.

Different varieties of sorghum, introduced some years ago in Arizona, various kinds of forage corn, teosinte, sweet and crimson clover, mangels, and various other crops are among those under observation.

Tobacco grows well in Arizona under irrigation. Some of the product is worked up by local manufacturers, more particularly for the Mexican trade. Sugar cane about equal to that raised in Louisiana and Texas can be grown in southern Arizona, both in the vicinity of Tucson and near Yuma.

In conclusion it may be stated that from an agricultural and horticultural point of view the past year has been an unusually prosperous one for Arizona. This is due in part to the increasing experience of the agricultural public with the conditions under which they are working, and in some cases to unusually good markets for agricultural products. On the whole there is good reason for belief in the growing future of agriculture in Arizona.

FORESTS.

Arizona has the largest unbroken pine forest in the United States, covering an area of over 6,000 square miles. This timber is usually found at an altitude between 5,500 and 7,500 feet. The total quantity of pine timber fit for sawing purposes within the boundaries of the Territory amounts to 10,000,000,000 feet, which can supply the needs of a populous State for more than a century. The principal forest area is in Coconino County and borders the Grand Canyon of the Colorado, although Gila, Apache, and Yavapai counties have considerable timber. In the Mogollon Mountains in Yavapai, Coconino, and Gila counties there are large bodies of oak timber suitable for the manufacture of farm machinery, wagons, etc., and for finishing lumber, but at present it is too inaccessible to be of great commercial value. The Government has created some large forest reserves in northern Arizona and promulgated rules for their regulation with a view to their preservation from spoliation and to prevent destruction by fire. The principal lumber mills of Arizona are situated at Flagstaff and Williams, in Coconino County, on the line of the Santa Fe Pacific Railway, and their equipment is modern in every way. The Arizona Lumber and Timber Company at Flagstaff and the Saginaw Lumber

Company at Williams have as complete plants for the manufacture of lumber, boxes, etc., as can be found in the United States.

The forests of Arizona are Sonorian in character and belong to the interior forest area, which covers all that region embraced between the forests of the Pacific and the extreme western limit of the Atlantic region. The forests of much of this area, when compared with those of more humid regions, are more stunted in growth, fewer individuals to a given area, and with much less variation in their composition. However, the forests of the southern portion of this area, which includes Arizona, are heavy, dense, and valuable, when compared with other portions of the interior region.

In this Territory the valuable forests are confined to the higher portions of the Colorado plateau and to the slopes and canyons of our numerous mountains. They attain their highest development in the high San Francisco Mountains, and from here stretch away with more or less extended interruptions to and beyond the Grand Canyon of the Colorado to the north, to Bill Williams Mountain in the west, and southward to the great rim where the Colorado plateau breaks down to the southern plains.

To the southwest, with a number of interruptions, they become dense and heavy in the higher ranges of the White Mountains, and from here extend into western New Mexico. Long arms of forest area also extend into all the mountains immediately south of the Colorado plateau which reach an elevation of more than 7,000 feet. The isolated ranges farther south are also timbered above 7,500 feet. The great forest area embraced in the Coconino and San Francisco region is considered by our greatest authority on American forests as one of the largest unbroken forests in the United States. It is almost entirely of yellow pine (*Pinus ponderosa*) and its varietal forms. This species of pine is the most widely disseminated and abundant tree of the interior forest area, and in Arizona, where it reaches its highest development, is practically the only tree of commercial importance in the manufacture of lumber.

On the higher mountains of northern Arizona, above the area of yellow pine, are a number of trees usually considered valuable for lumbering purposes, but their restricted area and inaccessibility render them as yet of little commercial value.

INDIGENOUS TREES AND SHRUBS FOR SHADE AND ORNAMENTAL PURPOSES.

The people of Arizona do not properly appreciate the value of nature's trees and shrubs to plant about their homes for ornamental and shade purposes. We can not expect to bring trees and shrubs from regions where they have been accustomed to humid atmosphere and grow them with any degree of success in Arizona.

We are inclined to look to foreign countries and other States for our ornamental trees and shrubs when, with a little care in selection, we can find in our own flora a variety of such plants that will grow with a minimum amount of care and in a few years surpass in appearance anything which we may bring in from outside. Generations of exposure to the conditions of an arid region enable them to survive and even flourish where plants unaccustomed to such environment perish.

The ash is one of our most valuable trees for street planting. Its growth is rapid and it is but little affected by insects. The cotton-

VIEW OF ENGINES AND LOG TRAIN OF SAGINAW LUMBER COMPANY ON SAGINAW SOUTHERN RAILROAD, WILLIAMS.

wood, although not so desirable as the ash, gives dense shade during the summer, grows with great rapidity, and requires little care. If in planting care is exercised to plant only staminate trees, no cotton will be produced and the chief objection to them removed. The desert willow, a beautiful tree with catalpa-like flowers, one of the most graceful trees in America, grows along the water courses of southern Arizona, and should take the place of many trees which we now get from outside.

It is hoped that the people of Arizona will give more attention to our native trees and shrubs, as they are more in harmony with our surroundings and better adapted to the purposes of landscape gardening. Many of our shrubs are evergreen, while others have attractive flowers or fruits. By proper care in selection they are in the end much more satisfactory and less liable to die than imported plants.

EDUCATIONAL.

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The University of Arizona is located near Tucson, the county seat of Pima County, and one of the largest towns in the Territory.

Tucson is on the main line of the Southern Pacific Railway, 312 miles west of El Paso, Tex., and 500 miles east of Los Angeles, Cal. It is easily reached from east and west without change and has railway connections with the central and northern portions of the Territory via Maricopa, and with northeastern States via Deming. The town lies in a broad, flat valley, at an elevation of 2,400 feet above sea level, and is surrounded by mountains. Its dry, healthful situation, with its mild and equable climate, has made Tucson a famous health resort, particularly for pulmonary patients.

The winter climate is especially good. Its temperature is cool and strengthening without being severe. The lowest temperature recorded during the average year is about 20 degrees above zero, Fahrenheit. But little rain falls during the winter; fogs are unknown; cloudy days are rare, the percentage of sunshine throughout the winter being greater than that recorded at any other place in the United States. In the summer the temperature ranges high, but the dry heat of this region differs greatly from the moist and oppressive heat of the Eastern and Gulf States. Owing to the extreme dryness of the air the highest temperatures known are less oppressive to the senses and less dangerous to the health than the summer heat of the Upper Mississippi Valley States.

The total amount of rainfall averages less than 12 inches. Of this amount fully one-half falls during July and August, yet the amount is so small as not materially to increase the atmospheric humidity, and the summers are found to be remarkably healthy. In general the climate may be described as well suited to nearly all people, but is particularly beneficial to the young, and to those who can not endure with comfort or safety the extremes of temperature and the sudden changes of northern climate.

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limits was selected as a site and was donated by the citizens of Tucson. A contract for erecting the main building was let in October, 1887, but owing to financial delays the building was not opened to students until October 1, 1891. The site selected is upon high ground about a mile from the business center of the city. On every side it commands a view of mountain scenery of remarkable extent and grandeur. The location can not be surpassed for healthfulness. The university possesses its own water system. The supply is drawn from a well on the premises 100 feet deep, and is of unusually good quality.

The main building is 200 by 105 feet, 2 stories in height, the lower story of gray stone, the upper of red brick, and is completely surrounded by a wide 2-story veranda. This building contains the offices, recitation rooms, laboratories, and apparatus rooms of the various departments; an assembly room; the libraries of the university and experiment station, and the Territorial museum. Adjoining the main building is the mining annex, 80 by 60 feet, filled with metallurgical machinery.

Three cottages have been built. They are of brick, 2 stories in height, and were intended to accommodate each two families. They were originally designed as homes for instructors, but owing to the pressure for accommodation for students on the university grounds, two of the cottages have been converted into homes for young ladies and furnish excellent accommodations for twenty-five persons, while the third is used as a residence for the president.

A dormitory built of a fine quality of gray stone, 2 stories in height, has been provided as a home for male students. It contains a students' dining room, kitchen connected therewith, and 20 rooms, each large enough to accommodate two students.

A substantial brick building contains a suite of rooms for the use of the assaying department, and also a carpenter shop. The assay rooms contain a large smelting furnace, with necessary muffle furnaces and other accessories, while the carpenter shop has an engine for power work, with lathes and other machinery for convenient operation.

Other buildings are the boiler house, which also contains the well and pumps whereby the water supply for irrigation and general purposes is obtained; the new greenhouse, 80 by 21 feet, built wholly of glass; the old greenhouse, now used as a propagating house, also of glass; the cottage occupied by the assistant horticulturist, and a temporary wooden building used as a young men's dormitory. It is expected that in the near future the university will be able to add another wing to the stone dormitory, nearly doubling the present dormitory accommodations, and thus relieving the pressing demands in that direction.

The library is a department of the university that is increasing in efficiency with the growth of the institution. The books have been selected with great care, with a view both to the requirements of the various departments of instruction and also to the building up of a well-balanced symmetrical collection of books. All the books are new and standard. The scientific works represent the highest and latest authority, while the literary and historical works are the writings of the best known and most thoroughly tried authors. A main object in making the selection has been to furnish students with books of the highest class and to encourage them in habits of careful reading. Complete bound sets of the leading American periodicals, both literary and scientific, are being collected every year, so that the library is already valuable as a means of research in present-day problems.

The latest editions of the best cyclopedias and dictionaries are constantly at the students' disposal. The leading American scientific and literary publications, as well as the Territorial newspapers, are found in the reading room. The reading room and library are open to students for an average of 8 hours each day.

Aside from Government publications and pamphlets, the library contains 3,600 bound volumes, of which 500 have been added during the present year. Of the whole number about three-fifths are scientific works, the remaining belonging to general literature, biography, and history.

A complete card catalogue of authors and title is maintained.

The chemical laboratories are two in number. The smaller one on the upper floor of the main buiding is for the use of students and is equipped for teaching the theory and practice of chemical science. The room for laboratory work is well lighted, provided with gas, water, working desks, ventilating hoods, an abundance of apparatus and chemicals with which to carry on experimental work, and can be made to accommodate about 24 students. Adjoining the large room is a small storeroom stocked with apparatus for demonstrating the principles of chemistry and containing well-selected collections of chemical substances.

The experiment station laboratory occupies three large working rooms and two small storerooms on the lower floor of the main building. This laboratory is

devoted to analytical work and chemical investigations relating to the agricultural interests of the Territory. It is excellently equipped for the special lines of investigation in which it is engaged, and although not primarily intended for the use of students, it has educational value to those who desire to witness the operations of a working laboratory. The equipment includes chemical balances, chemical apparatus and supplies, machinery for preparing samples, and special appliances for the analysis of milk, agricultural products, tanning materials. and soils.

The biological laboratories occupy three rooms in the southwest half, second floor, of the south wing of the main building. These rooms are piped for gas and water, and liberally provided with apparatus for research and for giving instruction on biological subjects. Students pursuing histological work are provided without expense with simple and compound microscopes, as the nature of their work demands. The laboratory is equipped with microtomes, culture baths, oven and other accessories used in modern methods of research.

An herbarium, containing nearly 10,000 sheets of plants, mostly indigenous to the Southwest, a large percentage being from Arizona, is an important factor in the equipment. Some fifty cases of insects, including one large cabinet, are of value in giving instruction in entomology and to illustrate the economic insects of Arizona. The work in general and systematic zoology is greatly facilitated by the Herbert Brown collection of birds, and by other zoological material which has been brought together during the past five years.

To aid in the study of human and comparative anatomy and physiology there are provided articulate and disarticulate human skeletons, plaster and papier-maché models of the important organs, and microscopical preparations illustrating the structure of the various tissues. The equipment also includes special apparatus for use of advanced students in the department.

Two rooms upon the first floor and near the central part of the main building are used for the work in the study of agriculture and horticulture, and for the agricultural experiment station headquarters. The equipment is fairly complete. There have been imported from Europe several of the best Azoux models of portions of the domestic animals, showing normal and morbid conditions; also several cases of products of the vegetable kingdom. A very large collection of garden and farm seeds has been secured and arranged in jars and properly labeled. There is also a selection of garden tools and instruments used in veterinary surgery. Recently there has been imported from Germany a collection of charts illustrating the anatomy and physiology of some of the fruits and grains. Specimens of the best fruits, grains, and other farm products are constantly received for examination; also specimens of an abnormal nature.

The old greenhouse, about 14 by 20 feet in area, is used as a propagating house, and a new one has just been built, 21 by 80 feet in size, constructed of glass throughout. Laboratory work is provided for in these greenhouses and in field work upon the university grounds. The general library contains many of the standard and most valuable of the recent publications upon agriculture in its various branches and the science upon which it is based. All the bulletins and reports of the experiment stations of the United States and foreign countries are on file in the station library, and the principal agricultural and horticultural journals are upon the table of the reading room.

Recognizing the fact that the first actual engagement secured by the engineering student will be either in the field with a surveying party or in the shop or drafting office, the equipment of this department has been chosen with a view to developing the highest skill in these fundamental lines of work. Already liberal, it is constantly being enlarged. It embraces surveyors' and engineers' chains; standard field and pocket tapes; plain and solar compasses and transits; engineers' levels; stadia, level, and transit rods; aneroid barometers; odometers; pedometers; automatic water registers; hook gages; three forms of current meters; stop watch; meteorological instruments; drafting instruments; mechanical calculators; blue-print apparatus; 4½-inch astronomical telescope with equatorial mountings and accessories; celestial sphere; a 75-light Mather dynamo; a Westinghouse high-speed engine; pumps, steam gauges, indicators, calorimeters, etc.

The department of mining and metallurgy is well equipped for giving both theoretical and practical instruction in the arts of mining, metallurgy, and assaying in all its branches.

Attached to the main building is an annex, or mill, containing machinery and appliances for crushing, sampling, concentrating, amalgamating, leaching, chloriding, cyaniding, and the electrical treatment of various kinds of ore in large or small lots. Power is furnished from a 70-horsepower boiler, detached from the main building, the steam being carried underground to the engine room, which contains a 85-horsepower engine, built by the Walburn-Swenson Manufacturing

Company, of Fort Scott, Kans., and a 16-horsepower Westinghouse automatic engine, the latter being used for running the dynamo.

The mill building has a storage capacity for ore of 50 to 100 tons. From the bins the ore passes to the crushing floor above. A 7-inch by 10-inch Blake crusher is used for coarse crushing, and a Dodge crusher for finer work. Beneath the Blake crusher is a set of 14-inch by 20-inch Cornish rolls, from which the ore passes by a conveyor to the main elevator, which carries it up 31 feet to the top of the mill. By means of slides and chutes the crushed ore may be sent at will to various machines to be tested by different methods. For concentration there are provided revolving sizing screens giving facilities for preparing six sizes, besides hydraulic separators for classifying slimes into three grades. The coarser sizes may be worked upon full-sized jigging machines of the Hartz pattern, the finer sizes being jigged upon bottom discharge machines, and the slime worked upon a double Rittinger percussion table, or otherwise as desired. A small apparatus, run by an electric motor, is also provided for dry concentration. Amalgamation tests may be made upon a working scale by different methods including plates and riffles, plans and settlers, etc. A 5-stamp gold mill with silvered plates and aprons of the latest and most improved construction, by Frazer & Chalmers, of Chicago, has recently been added to the mill, thus permitting the working of free-milling gold ores by the usual methods and on a large scale. Several lots of ore have been successfully worked and returns made in gold bullion, thus familiarizing the mining students with all the details of seeding, stamping, cleaning up, retorting, smelting, and assaying.

In addition to the 5-stamp mill, a smaller prospecting mill of three stamps has been added so as to work small lots of ore of from 100 to 500 pounds. A sampling mill permits of rapid crushing and mixing large samples preparatory to assaying.

The assay laboratory is equipped with assay furnaces for crucible work, for scorifying and cupelling, and for retorting mercury from amalgam. An adjoining room, supplied with water, gas, and electric current, has a roomy hood for work involving fumes, with tables and desks for student work, besides all needed appliances for assaying by dry and wet methods, including electrolysis.

The laboratory also has desks and fittings for the chemical work required in the metallurgical and mineralogical investigation and analysis of ores, mineral fortilizers, and qualitative tests of minerals.

Three large rooms in the basement of the main building are set apart for the teaching of physics. The facilities for experimental demonstration of all important phenomena are very complete. The lecture room is fitted with shutters, so that it can be darkened. A beam of sunlight, directed by a fine clock heliostat outside, may be thrown steadily across the lecture table for experiments on light, or used in connection with the solar lantern for a variety of other work. The lecture table is supplied with gas, water, electric currents from primary and storage batteries, and from the large dynamo.

Adjacent to the lecture room are the physical laboratory and the apparatus room in which are kept the many instruments owned by the university, among which may be mentioned an Atwood's machine, Kater's pendulum, whirling table, many balances, barometers, an air pump and accessories, a hand dynamo, motors, six storage cells, a large number of primary batteries, induction coils, Deprez-D'Arsonval tangent, and sine galvanometers, rheostats, Wheatstone's bridges, a fine testing set, a Wimshurst electric machine, Leyden jars, Geissler's and Crooke's tubes, diapasons, a sonometer, lenses, prisms, and mirrors of all kinds, a polariscope, steam gauges, indicators, calorimeters, and a full equipment of simple pieces of apparatus for the use of elementary classes.

The Territorial Normal School, South.

The legislative enactment providing for the organization of this school also stated the design and purpose of its establisment to be, "that a normal school for the Territory of Arizona is established at Tempe, in Maricopa County, Ariz., the purpose of which shall be the instruction of persons, both male and female, in the art of teaching, and in all the various branches that pertain to a good common-school education; also to give instruction in the mechanical arts and in husbandry and agricultural chemistry, in the fundamental laws of the United States, and what regards the rights and duties of citizens." With the approval of the board of education, after a careful consideration of concomitant conditions, the faculty has, up to the present time, limited the work of this school to the instruction and training of teachers, notwithstanding the fact that the legislature has provided for a much broader field of activity.

LOCATION.

The location of this school at Tempe seems very fortunate. Tempe is situated in the beautiful valley of the Salt River, 7 miles from the capital. It has railroad connection with the Southern Pacific and Santa Fe systems by the Maricopa and Phœnix and Salt River Valley Railroad. The climate here is delightful during the whole of the school year, and the cost of living is less than at any other place in the Territory. The school is in the midst of an intelligent and moral community engaged in farming and fruit raising.

CAMPUS.

The campus includes 20 acres, and is under a high state of cultivation. The north half is set with shade and ornamental trees and shrubs, which form a beautiful grove, many of the trees reaching a height of 40 feet. The great variety of plant-life forms found on the campus and on the cultivated and desert lands in the vicinity is a great aid to the students in the study of botany.

BUILDINGS.

The building heretofore used for school purposes was erected in 1886 at a cost of $6,500. It is a one-story brick structure, 70 feet long and 60 feet wide, with a broad veranda entirely surrounding it, and was a comfortable home for the school the first seven years of its existence.

The new normal school building was completed in the summer of 1897, and has been occupied by the school the past year. It is a commodious structure, 136 feet long, 80 feet wide, and three stories high. The lower story is of brown sandstone, the other two of red pressed brick with sandstone trimmings. This edifice is beautiful in architectural design, convenient in arrangement, and substantial in construction. Its appointments embrace all the modern school conveniences, such as cloakrooms, closets, recitation rooms, study hall, assembly hall, laboratories, etc. Its fixtures comprise a complete outfit of tables and cases sufficient to accommodate 36 students working at the same time, tablet-arm chairs to seat 160 students, recitation seats for 100 students, tables and chairs to accommodate 40 students in drawing at the same time, besides desks and sittings for 175 students in the normal department proper. In addition to this, the school of practice is furnished with adjustable seats and desks and other modern appliances to accommodate pupils of the several grades to the number of 70. The assembly hall is seated with 400 tablet-arm opera chairs, and will accommodate 500 persons when seated to its full capacity. All things considered, the building is excellently equipped for the purposes of normal school work.

ATTENDANCE.

This school has had a steady, healthy growth from its opening for the reception of students in January, 1886, to the present time. In the first half decade of its existence the attendance increased from 26 in 1886, to 54 in the school year 1890–91.

During the last five years the total enrollment of this school has been as follows: Seventy-six in the scholastic year 1891-92, 87 in 1892-93, 91 in 1893-94, 94 in 1894-95, 134 in 1895-96, 158 in 1896-97, 173 in 1897-98, and 205 in 1899. This is exclusive of the school of practice department, whose number is limited to 80 in all grades. The greatly increased attendance for the past three years is a good index of the estimation in which the work of this institution is held by the public. Every county in the territory has been represented by students in this school during the year just closed.

COURSE OF STUDY.

The work of the normal department of this school is laid out in two courses of study and practice—the elementary and the higher. The elementary course has been considerably strengthened during the past two years. It now comprises three years' work, as formerly, but requires one year's work more of preparation for admission to it. The higher course has been formulated and will be put in effective operation as soon as available funds will warrant the employment of a sufficient teaching force to do so. It requires four years for its completion and gives better preparation for teaching the higher branches. It carries the academic work through the requirements for admission to the best universities of our country.

Each of these courses requires a year of professional work and practice teaching. These courses also include systematic training in light gymnastics for all students and military drill for the young men. The advantages of such training to the bodily health and carriage of the student is unquestioned. Sufficient training is given along these lines to enable the students to introduce these exercises into the schools in which they may be employed as teachers. It should be borne in mind, however, that the main aim and effort of all the work in the normal school is professional training; that instruction in other lines of the curricula is incidental, but nevertheless necessary, for methods in teaching can not be imparted apart from the subject-matter. For a more minute analysis of the course of study and fuller details of the condition of this school, reference is here made to the annual catalogue published in 1898. These courses have been formulated with a fixed purpose to give the student the greatest possible advantages, the educational status of the Territory and the financial ability of the average student being carefully considered. The scope of these courses of study gives this school a creditable rank with similar institutions in the older communities of our country. The course of study in the school of practice covers the work of the eight grades of the primary and grammar school curricula of the public schools.

In addition, there is much work designed to develop and strengthen the faculties of the child and to render him more self-helpful from day to day and to give added zest to the routine of the school. Nature study is made a prominent feature of this work.

The practice school fits its pupils for the normal department proper, and is open to pupils of school age from any part of the Territory, who are admitted in the order of their application until each grade is filled to its maximum, which has been fixed by the board of education at ten. This department has become so popular that there are always more applicants than can be accommodated.

SCHOLASTIC YEAR.

The school year comprises forty weeks of actual work, divided into four terms of ten weeks each. The subdivision of the calendar gives students who can not attend school consecutively for a whole year a better opportunity to arrange their work and receive credit therefor toward the quantum requisite for graduation.

BRANCHES OF STUDY PURSUED.

The academic work during the past year was distributed as follows: Algebra, 74; arithmetic, 81; botany, 61; bookkeeping, 26; chemistry, 19; composition, 72; civics, 25; drawing, 112; elocution, 24; English literature, 68; ethics, 34; political geography, 37; physical geography, 11; geology, 28; geometry, 64; grammar, 48; United States history, 38; music, 95; orthography, 146; general history, 62; physics, 28; physiology, 52; psychology, 68; school law, 40; reading, 42; writing, 48; word analysis, 26; zoology, 21.

The professional work was pursued by the students in classes whose numbers are indicated below: History of education, 21; methods of teaching, 50; observation of critic teacher's work, 25; school management, 18; practice teaching, 23; theses on professional topics, 21.

There were 68 members in the class in military drill and 27 in special work in physical culture. The whole school had training in free gymnastics during the winter months.

LIBRARY.

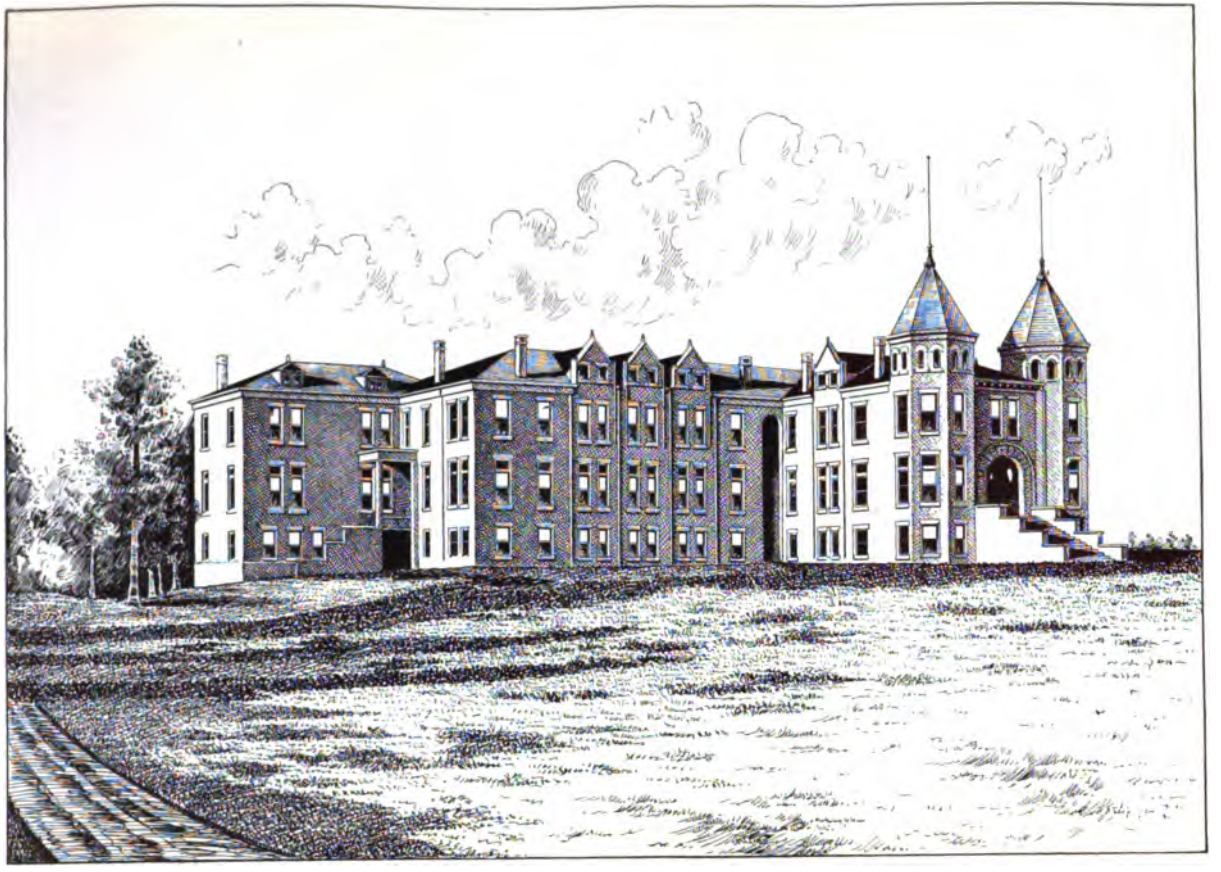
The library now contains more than seven hundred volumes, comprising works on history, science, education, and general literature. Many of the valuable publications of the Smithsonian Institution, and other publications of the Department of the Interior, are found on its shelves. Appleton's new edition of Johnson's Cyclopedia, Appleton's Scientific Library, and a few other books have been added to it the current year. It contains a fair supply of reference books for the present needs of the school.

MUSEUM.

The museum already contains many valuable archæolgical relics and quite a number of interesting specimens of animals, plants, and minerals characteristic of Arizona, such as copper, silver, gold, and lead ores, native insects, birds, small animals, and plants, and also many specimens from other parts of the world.

NORMAL SCHOOL, NORTH.

A second normal school was created by the twentieth legislative assembly in March last. The new institution is located at Flagstaff,



NORMAL SCHOOL, NORTH FLAGSTAFF.

UNIV. OF

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limits was selected as a site and was donated by the citizens of Tucson. A contract for erecting the main building was let in October, 1887, but owing to financial delays the building was not opened to students until October 1, 1891. The site selected is upon high ground about a mile from the business center of the city. On every side it commands a view of mountain scenery of remarkable extent and grandeur. The location can not be surpassed for healthfulness. The university possesses its own water system. The supply is drawn from a well on the premises 100 feet deep, and is of unusually good quality.

The main building is 200 by 105 feet, 2 stories in height, the lower story of gray stone, the upper of red brick, and is completely surrounded by a wide 2-story veranda. This building contains the offices, recitation rooms, laboratories, and apparatus rooms of the various departments; an assembly room; the libraries of the university and experiment station, and the Territorial museum. Adjoining the main building is the mining annex, 80 by 60 feet, filled with metallurgical machinery.

Three cottages have been built. They are of brick, 2 stories in height, and were intended to accommodate each two families. They were originally designed as homes for instructors, but owing to the pressure for accommodation for students on the university grounds, two of the cottages have been converted into homes for young ladies and furnish excellent accommodations for twenty-five persons, while the third is used as a residence for the president.

A dormitory built of a fine quality of gray stone, 2 stories in height, has been provided as a home for male students. It contains a students' dining room, kitchen connected therewith, and 20 rooms, each large enough to accommodate two students.

A substantial brick building contains a suite of rooms for the use of the assaying department, and also a carpenter shop. The assay rooms contain a large smelting furnace, with necessary muffle furnaces and other accessories, while the carpenter shop has an engine for power work, with lathes and other machinery for convenient operation.

Other buildings are the boiler house, which also contains the well and pumps whereby the water supply for irrigation and general purposes is obtained; the new greenhouse, 80 by 21 feet, built wholly of glass; the old greenhouse, now used as a propagating house, also of glass; the cottage occupied by the assistant horticulturist, and a temporary wooden building used as a young men's dormitory. It is expected that in the near future the university will be able to add another wing to the stone dormitory, nearly doubling the present dormitory accommodations, and thus relieving the pressing demands in that direction.

The library is a department of the university that is increasing in efficiency with the growth of the institution. The books have been selected with great care, with a view both to the requirements of the various departments of instruction and also to the building up of a well-balanced symmetrical collection of books. All the books are new and standard. The scientific works represent the highest and latest authority, while the literary and historical works are the writings of the best known and most thoroughly tried authors. A main object in making the selection has been to furnish students with books of the highest class and to encourage them in habits of careful reading. Complete bound sets of the leading American periodicals, both literary and scientific, are being collected every year, so that the library is already valuable as a means of research in present-day problems.

The latest editions of the best cyclopedias and dictionaries are constantly at the students' disposal. The leading American scientific and literary publications, as well as the Territorial newspapers, are found in the reading room. The reading room and library are open to students for an average of 8 hours each day.

Aside from Government publications and pamphlets, the library contains 3,600 bound volumes, of which 500 have been added during the present year. Of the whole number about three-fifths are scientific works, the remaining belonging to general literature, biography, and history.

A complete card catalogue of authors and title is maintained.

The chemical laboratories are two in number. The smaller one on the upper floor of the main builing is for the use of students and is equipped for teaching the theory and practice of chemical science. The room for laboratory work is well lighted, provided with gas, water, working desks, ventilating hoods, an abundance of apparatus and chemicals with which to carry on experimental work, and can be made to accommodate about 24 students. Adjoining the large room is a small storeroom stocked with apparatus for demonstrating the principles of chemistry and containing well-selected collections of chemical substances.

The experiment station laboratory occupies three large working rooms and two small storerooms on the lower floor of the main building. This laboratory is

devoted to analytical work and chemical investigations relating to the agricultural interests of the Territory. It is excellently equipped for the special lines of investigation in which it is engaged, and although not primarily intended for the use of students, it has educational value to those who desire to witness the operations of a working laboratory. The equipment includes chemical balances, chemical apparatus and supplies, machinery for preparing samples, and special appliances for the analysis of milk, agricultural products, tanning materials, and soils.

The biological laboratories occupy three rooms in the southwest half, second floor, of the south wing of the main building. These rooms are piped for gas and water, and liberally provided with apparatus for research and for giving instruction on biological subjects. Students pursuing histological work are provided without expense with simple and compound microscopes, as the nature of their work demands. The laboratory is equipped with microtomes, culture baths, oven and other accessories used in modern methods of research.

An herbarium, containing nearly 10,000 sheets of plants, mostly indigenous to the Southwest, a large percentage being from Arizona, is an important factor in the equipment. Some fifty cases of insects, including one large cabinet, are of value in giving instruction in entomology and to illustrate the economic insects of Arizona. The work in general and systematic zoology is greatly facilitated by the Herbert Brown collection of birds, and by other zoological material which has been brought together during the past five years.

To aid in the study of human and comparative anatomy and physiology there are provided articulate and disarticulate human skeletons, plaster and papier-maché models of the important organs, and microscopical preparations illustrating the structure of the various tissues. The equipment also includes special apparatus for use of advanced students in the department.

Two rooms upon the first floor and near the central part of the main building are used for the work in the study of agriculture and horticulture, and for the agricultural experiment station headquarters. The equipment is fairly complete. There have been imported from Europe several of the best Azoux models of portions of the domestic animals, showing normal and morbid conditions; also several cases of products of the vegetable kingdom. A very large collection of garden and farm seeds has been secured and arranged in jars and properly labeled. There is also a selection of garden tools and instruments used in veterinary surgery. Recently there has been imported from Germany a collection of charts illustrating the anatomy and physiology of some of the fruits and grains. Specimens of the best fruits, grains, and other farm products are constantly received for examination; also specimens of an abnormal nature.

The old greenhouse, about 14 by 20 feet in area, is used as a propagating house, and a new one has just been built, 21 by 80 feet in size, constructed of glass throughout. Laboratory work is provided for in these greenhouses and in field work upon the university grounds. The general library contains many of the standard and most valuable of the recent publications upon agriculture in its various branches and the science upon which it is based. All the bulletins and reports of the experiment stations of the United States and foreign countries are on file in the station library, and the principal agricultural and horticultural journals are upon the table of the reading room.

Recognizing the fact that the first actual engagement secured by the engineering student will be either in the field with a surveying party or in the shop or drafting office, the equipment of this department has been chosen with a view to developing the highest skill in these fundamental lines of work. Already liberal, it is constantly being enlarged. It embraces surveyors' and engineers' chains; standard field and pocket tapes; plain and solar compasses and transits; engineers' levels; stadia, level, and transit rods; aneroid barometers; odometers, pedometers; automatic water registers; hook gages; three forms of current meters; stop watch; meteorological instruments; drafting instruments; mechanical calculators; blue-print apparatus; 4½-inch astronomical telescope with equatorial mountings and accessories; celestial sphere; a 75-light Mather dynamo; a Westinghouse high-speed engine; pumps, steam gauges, indicators, calorimeters, etc.

The depar'ment of mining and metallurgy is well equipped for giving both theoretical and practical instruction in the arts of mining, metallurgy, and assaying in all its branches.

Attached to the main building is an annex, or mill, containing machinery and appliances for crushing, sampling, concentrating, amalgamating, leaching, chloriding, cyaniding, and the electrical treatment of various kinds of ore in large or small lots. Power is furnished from a 70-horsepower boiler, detached from the main building, the steam being carried underground to the engine room, which contains a 35-horsepower engine, built by the Walburn-Swenson Manufacturing

Company, of Fort Scott, Kans., and a 16-horsepower Westinghouse automatic engine, the latter being used for running the dynamo.

The mill building has a storage capacity for ore of 50 to 100 tons. From the bins the ore passes to the crushing floor above. A 7-inch by 10-inch Blake crusher is used for coarse crushing, and a Dodge crusher for finer work. Beneath the Blake crusher is a set of 14-inch by 20-inch Cornish rolls, from which the ore passes by a conveyor to the main elevator, which carries it up 31 feet to the top of the mill. By means of slides and chutes the crushed ore may be sent at will to various machines to be tested by different methods. For concentration there are provided revolving sizing screens giving facilities for preparing six sizes, besides hydraulic separators for classifying slimes into three grades. The coarser sizes may be worked upon full-sized jigging machines of the Hartz pattern, the finer sizes being jigged upon bottom discharge machines, and the slime worked upon a double Rittinger percussion table, or otherwise as desired. A small apparatus, run by an electric motor, is also provided for dry concentration. Amalgamation tests may be made upon a working scale by different methods including plates and riffles, plans and settlers, etc. A 5-stamp gold mill with silvered plates and aprons of the latest and most improved construction, by Frazer & Chalmers, of Chicago, has recently been added to the mill, thus permitting the working of free-milling gold ores by the usual methods and on a large scale. Several lots of ore have been successfully worked and returns made in gold bullion, thus familiarizing the mining students with all the details of seeding, stamping, cleaning up, retorting, smelting, and assaying.

In addition to the 5-stamp mill, a smaller prospecting mill of three stamps has been added so as to work small lots of ore of from 100 to 500 pounds. A sampling mill permits of rapid crushing and mixing large samples preparatory to assaying.

The assay laboratory is equipped with assay furnaces for crucible work, for scorifying and cupelling, and for retorting mercury from amalgam. An adjoining room, supplied with water, gas, and electric current, has a roomy hood for work involving fumes, with tables and desks for student work, besides all needed appliances for assaying by dry and wet methods, including electrolysis.

The laboratory also has desks and fittings for the chemical work required in the metallurgical and mineralogical investigation and analysis of ores, mineral fertilizers, and qualitative tests of minerals.

Three large rooms in the basement of the main building are set apart for the teaching of physics. The facilities for experimental demonstration of all important phenomena are very complete. The lecture room is fitted with shutters, so that it can be darkened. A beam of sunlight, directed by a fine clock heliostat outside, may be thrown steadily across the lecture table for experiments on light, or used in connection with the solar lantern for a variety of other work. The lecture table is supplied with gas, water, electric currents from primary and storage batteries, and from the large dynamo.

Adjacent to the lecture room are the physical laboratory and the apparatus room in which are kept the many instruments owned by the university, among which may be mentioned an Atwood's machine, Kater's pendulum, whirling table, many balances, barometers, an air pump and accessories, a hand dynamo, motors, six storage cells, a large number of primary batteries, induction coils, Deprez-D'Arsonval tangent, and sine galvanometers, rheostats, Wheatstone's bridges, a fine testing set, a Wimshurst electric machine, Leyden jars, Geissler's and Crooke's tubes, diapasons, a sonometer, lenses, prisms, and mirrors of all kinds, a polariscope, steam gauges, indicators, calorimeters, and a full equipment of simple pieces of apparatus for the use of elementary classes.

The Territorial Normal School, South.

The legislative enactment providing for the organization of this school also stated the design and purpose of its establisment to be, "that a normal school for the Territory of Arizona is established at Tempe, in Maricopa County, Ariz., the purpose of which shall be the instruction of persons, both male and female, in the art of teaching, and in all the various branches that pertain to a good common-school education; also to give instruction in the mechanical arts and in husbandry and agricultural chemistry, in the fundamental laws of the United States, and what regards the rights and duties of citizens." With the approval of the board of education, after a careful consideration of concomitant conditions, the faculty has, up to the present time, limited the work of this school to the instruction and training of teachers, notwithstanding the fact that the legislature has provided for a much broader field of activity.

LOCATION.

The location of this school at Tempe seems very fortunate. Tempe is situated in the beautiful valley of the Salt River, 7 miles from the capital. It has railroad connection with the Southern Pacific and Santa Fe systems by the Maricopa and Phœnix and Salt River Valley Railroad. The climate here is delightful during the whole of the school year, and the cost of living is less than at any other place in the Territory. The school is in the midst of an intelligent and moral community engaged in farming and fruit raising.

CAMPUS.

The campus includes 20 acres, and is under a high state of cultivation. The north half is set with shade and ornamental trees and shrubs, which form a beautiful grove, many of the trees reaching a height of 40 feet. The great variety of plant-life forms found on the campus and on the cultivated and desert lands in the vicinity is a great aid to the students in the study of botany.

BUILDINGS.

The building heretofore used for school purposes was erected in 1886 at a cost of $6,500. It is a one-story brick structure, 70 feet long and 60 feet wide, with a broad veranda entirely surrounding it, and was a comfortable home for the school the first seven years of its existence.

The new normal school building was completed in the summer of 1897, and has been occupied by the school the past year. It is a commodious structure, 136 feet long, 80 feet wide, and three stories high. The lower story is of brown sandstone, the other two of red pressed brick with sandstone trimmings. This edifice is beautiful in architectural design, convenient in arrangement, and substantial in construction. Its appointments embrace all the modern school conveniences, such as cloakrooms, closets, recitation rooms, study hall, assembly hall, laboratories, etc. Its fixtures comprise a complete outfit of tables and cases sufficient to accommodate 36 students working at the same time, tablet-arm chairs to seat 160 students, recitation seats for 100 students, tables and chairs to accommodate 40 students in drawing at the same time, besides desks and sittings for 175 students in the normal department proper. In addition to this, the school of practice is furnished with adjustable seats and desks and other modern appliances to accommodate pupils of the several grades to the number of 70. The assembly hall is seated with 400 tablet-arm opera chairs, and will accommodate 500 persons when seated to its full capacity. All things considered, the building is excellently equipped for the purposes of normal school work.

ATTENDANCE.

This school has had a steady, healthy growth from its opening for the reception of students in January, 1886, to the present time. In the first half decade of its existence the attendance increased from 26 in 1886, to 54 in the school year 1890-91.

During the last five years the total enrollment of this school has been as follows: Seventy-six in the scholastic year 1891-92, 87 in 1892-93, 91 in 1893-94, 94 in 1894-95, 134 in 1895-96, 158 in 1896-97, 173 in 1897-98, and 205 in 1899. This is exclusive of the school of practice department, whose number is limited to 80 in all grades. The greatly increased attendance for the past three years is a good index of the estimation in which the work of this institution is held by the public. Every county in the territory has been represented by students in this school during the year just closed.

COURSE OF STUDY.

The work of the normal department of this school is laid out in two courses of study and practice—the elementary and the higher. The elementary course has been considerably strengthened during the past two years. It now comprises three years' work, as formerly, but requires one year's work more of preparation for admission to it. The higher course has been formulated and will be put in effective operation as soon as available funds will warrant the employment of a sufficient teaching force to do so. It requires four years for its completion and gives better preparation for teaching the higher branches. It carries the academic work through the requirements for admission to the best universities of our country.

Each of these courses requires a year of professional work and practice teaching. These courses also include systematic training in light gymnastics for all students and military drill for the young men. The advantages of such training to the bodily health and carriage of the student is unquestioned. Sufficient training is given along these lines to enable the students to introduce these exercises into the schools in which they may be employed as teachers. It should be borne in mind, however, that the main aim and effort of all the work in the normal school is professional training; that instruction in other lines of the curricula is incidental, but nevertheless necessary, for methods in teaching can not be imparted apart from the subject-matter. For a more minute analysis of the course of study and fuller details of the condition of this school, reference is here made to the annual catalogue published in 1898. These courses have been formulated with a fixed purpose to give the student the greatest possible advantages, the educational status of the Territory and the financial ability of the average student being carefully considered. The scope of these courses of study gives this school a creditable rank with similar institutions in the older communities of our country. The course of study in the school of practice covers the work of the eight grades of the primary and grammar school curricula of the public schools.

In addition, there is much work designed to develop and strengthen the faculties of the child and to render him more self-helpful from day to day and to give added zest to the routine of the school. Nature study is made a prominent feature of this work.

The practice school fits its pupils for the normal department proper, and is open to pupils of school age from any part of the Territory, who are admitted in the order of their application until each grade is filled to its maximum, which has been fixed by the board of education at ten. This department has become so popular that there are always more applicants than can be accommodated.

SCHOLASTIC YEAR.

The school year comprises forty weeks of actual work, divided into four terms of ten weeks each. The subdivision of the calendar gives students who can not attend school consecutively for a whole year a better opportunity to arrange their work and receive credit therefor toward the quantum requisite for graduation.

BRANCHES OF STUDY PURSUED.

The academic work during the past year was distributed as follows: Algebra, 74; arithmetic, 81; botany, 61; bookkeeping, 26; chemistry, 19; composition, 72; civics, 25; drawing, 112; elocution, 24; English literature, 68; ethics, 34; political geography, 37; physical geography, 11; geology, 28; geometry, 64; grammar, 48; United States history, 38; music, 95; orthography, 146; general history, 62; physics, 28; physiology, 52; psychology, 68; school law, 40; reading, 42; writing, 48; word analysis, 26; zoology, 21.

The professional work was pursued by the students in classes whose numbers are indicated below: History of education, 21; methods of teaching, 50; observation of critic teacher's work, 25; school management, 18; practice teaching, 23; theses on professional topics, 21.

There were 68 members in the class in military drill and 27 in special work in physical culture. The whole school had training in free gymnastics during the winter months.

LIBRARY.

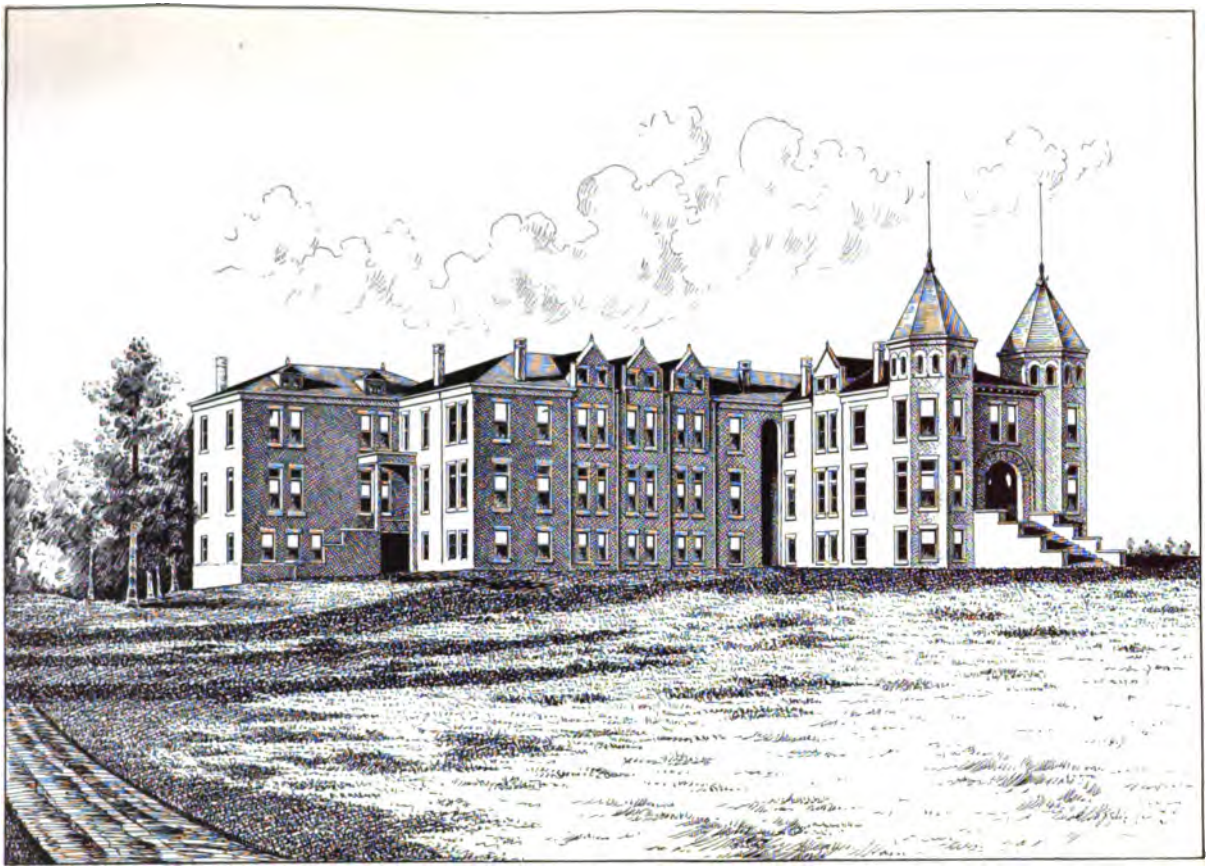
The library now contains more than seven hundred volumes, comprising works on history, science, education, and general literature. Many of the valuable publications of the Smithsonian Institution, and other publications of the Department of the Interior, are found on its shelves. Appleton's new edition of Johnson's Cyclopedia, Appleton's Scientific Library, and a few other books have been added to it the current year. It contains a fair supply of reference books for the present needs of the school.

MUSEUM.

The museum already contains many valuable archæolgical relics and quite a number of interesting specimens of animals, plants, and minerals characteristic of Arizona, such as copper, silver, gold, and lead ores, native insects, birds, small animals, and plants, and also many specimens from other parts of the world.

NORMAL SCHOOL, NORTH.

A second normal school was created by the twentieth legislative assembly in March last. The new institution is located at Flagstaff,



NORMAL SCHOOL, NORTH FLAGSTAFF.

in Coconino County, and is an important addition to the educational system of the Territory. It is located on a tract of 130 acres of land previously acquired by the Territory and known as a "Home for the Insane," although never used for that purpose. The building is of stone, and commodious and convenient in its appointments. It is the finest public building in Arizona so far constructed.

The northern Arizona normal school opens its first term at Flagstaff September 11. This, the first high grade educational institution in northern Arizona, will start its work under the most favorable circumstances. The school building is architecturally beautiful, and is located in one of the most scenic spots of a scenic region. It is more than ample in size, and has been fitted up for the use of the school in a manner that will conduce most effectually toward convenience in all departments.

The range of studies to be pursued in the new institution is to be a broad one, for, by the act creating it, there must be maintained preparatory and high school courses. The normal course will be a parallel one with that pursued at the older school at Tempe, and completion of the prescribed work will secure a diploma granting a life license to teach in any of the schools of Arizona. There will be, as well, academic work qualifying the student for entrance into any of the universities of the Union.

The school system of the Territory is modeled after that of California. The school district is the unit of the system, and is controlled by a board of trustees, three in number, one of whom is chosen annually by those residents of the district who pay a school tax or are parents of children of school age. The trustees have the detailed management of the schools in their districts, employ the teachers, have charge of the buildings and grounds, etc. The districts are supervised by a county superintendent, who is required in most instances to visit each school in his county. He apportions all school moneys on the following basis: To every district having more than 10 and less than 20 census children $400, and $500 to every district having more than 20 children, and in addition thereto not less than $20 per capita upon the average daily attendance in excess of 25. He also audits all school accounts. The superintendent of public instruction, with the board of education, exercises general control over school affairs in the Territory.

The support of the schools is by taxation, no revenue being derived from the school lands except a small rental for their use. The territorial tax is 3 cents on each $100 of value, while the county tax rises from 30 cents, the minimum rate, to 80 cents, the maximum rate, on each $100 of valuation in the county. To the sums thus raised are added the receipts from poll taxes, gambling licenses, fines, and escheated estates.

The schools are divided into primary, grammar, and high schools. The subjects taught and the methods pursued are similar to those of like grades in the States. A uniform series of text-books is adopted and their use is compulsory in all the schools, so that children in changing residence from one district to another can enter their proper grades in the school and use the same books.

A full and complete manual and course of study for the use and guidance of the teachers and pupils is in course of preparation, and will be ready for distribution about October 1 of the present year.

The teachers in charge of the schools are in number 373, of which 251 are women and 122 men. Of the total number 120 are graduates

of normal schools. The average monthly salaries paid men is $74.70 and the women $64.40.

The following tables show the school population, school attendance, receipts, expenditures, and value of school property at the close of the school year ending June 30, 1899:

Receipts.

Counties.	Balance on hand at beginning of school year July 1, 1898.	Territorial tax.	County taxes, fines, etc.	District taxes.	Miscellaneous sources.	Total.
Apache	$585.87	$502.07	$6,193.42			$7,290.86
Cochise	9,255.59	770.14	18,017.92	$2,400.69	$904.42	31,348.76
Coconino	308.97	312.21	14,537.97		95.47	15,254.62
Gila	1,320.99	322.31	17,215.69			18,918.99
Graham	2,159.14	1,308.05	18,484.20			21,946.39
Maricopa	9,050.78	2,222.30	69,513.48		69.40	80,925.96
Mohave	1,139.47	149.99	6,660.01		446.50	7,395.97
Navajo	2,533.02	460.05	11,512.02			14,525.09
Pima	2,518.30	2,135.41	17,074.53		586.67	22,314.91
Pinal	1,357.91	408.15	9,053.49		28.00	10,842.55
Santa Cruz	1,046.94		6,882.32			7,929.26
Yavapai	3,409.64	973.83	33,626.17		24.55	38,034.19
Yuma	102.06	375.49	8,551.10			9,028.65
Total	34,818.18	10,000.00	236,882.32	2,400.69	2,155.01	285,756.20

Expenditures.

Counties.	Teachers' salaries.	Rents, repairs, fuel, and contingent expenses.	School libraries	School apparatus.	Sites, buildings, and school furniture.	Total expenditure.
Apache	$5,429.35	$1,306.47		$39.50		$6,775.32
Cochise	17,146.75	4,589.36	$20.00	136.10	$3,902.47	25,794.68
Coconino	7,200.50	2,147.88	54.22	125.00	546.40	10,074.00
Gila	6,933.75	1,352.21	30.00	170.00	831.53	9,317.49
Graham	12,993.20	4,732.15			208.90	17,934.25
Maricopa	51,199.60	18,212.04	80.10	820.45	887.02	77,149.21
Mohave	4,744.25	1,521.15				6,265.40
Navajo	8,632.65	1,380.09		274.74	1,623.27	11,910.75
Pima	14,954.84	3,602.77	5.00	121.55		18,684.16
Pinal	7,331.53	1,777.05		113.00	124.60	9,346.18
Santa Cruz	7,211.25	951.97	35.22	71.50	153.70	8,423.64
Yavapai	27,387.50	5,969.33	62.25	565.40	229.20	34,213.68
Yuma	6,949.15	1,146.01			757.17	8,852.33
Total	178,114.32	48,688.48	286.79	2,437.24	2,914.26	238,741.09

Valuation of school property.

Counties.	Lots, schoolhouses, and furniture.	School libraries.	School apparatus.	Total school property.
Apache	$10,332	$200	$853	$11,385
Cochise	22,541	1,485	1,745	25,771
Coconino	29,100	160	810	30,070
Gila	5,925	30	170	6,125
Graham	18,946	4	1,478	20,328
Maricopa	119,740	2,059	5,256	207,055
Mohave	8,980	260	1,040	10,180
Navajo	13,630	128	1,667	15,425
Pima	83,161	260	776	84,197
Pinal	16,689	120	1,160	17,969
Santa Cruz	6,375	129	820	7,324
Yavapai	41,518	667	3,690	45,875
Yuma	8,100	500	200	8,800
Total	465,037	6,002	19,465	490,504

Census statistics.

Counties.	White children between 6 and 18 years.			Colored children between 6 and 18 years.			Census children between 6 and 18 years.	Children between 8 and 14 years.	
	Boys.	Girls.	Total.	Boys.	Girls.	Total.		White.	Colored.
Apache	493	430	923	.....	.....	.....	923	531	.....
Cochise	790	734	1,524	6	2	8	1,532	1,008	4
Coconino	348	336	684	.....	1	1	685	372	1
Gila	347	324	671	13	4	17	688	352	9
Graham	1 518	1.467	2,985	7	3	10	2,995	1,595	6
Maricopa	2,260	2,180	4,440	15	8	23	4,463	2,356	13
Mohave	138	153	291	.....	.....	.....	291	134	.....
Navajo	432	437	869	13	14	27	896	481	14
Pima	1,335	1,328	2 663	4	4	8	2,671	1,410	.....
Pinal	413	405	818	5	10	15	833	448	9
Santa Cruz	565	569	1.134	2	1	3	1,137	601	.....
Yavapai	1,019	882	1 901	32	40	72	1,973	1,107	45
Yuma	387	346	733	1	2	3	736	455	2
Total	10,045	9,591	19,636	98	89	187	19,823	10,850	103

School attendance.

Counties.	Schools.	Grade of school.		Enrolled on register.		Total enrolled	Average number belonging	Average daily attendance.	Months school was maintained.
		Grammar.	Primary.	Boys.	Girls.				
Apache	19	6	13	490	420	910	629	564	5
Cochise	28	5	23	689	640	1,329	917	840	7.35
Coconino	12	5	7	278	271	549	362	331	6.16
Gila	15	12	3	279	250	529	360	316	7.25
Graham	41	8	33	989	984	1,973	1,308	1,152	5.50
Maricopa	91	32	59	2,236	2,031	4,267	2,812	2,600	7
Mohave	11	6	5	135	147	282	210	193	6.30
Navajo	24	6	18	457	474	931	720	654	6
Pima	17	2	15	808	647	1,455	905	806	6.65
Pinal	18	4	14	334	339	673	435	410	6
Santa Cruz	16	3	13	430	446	876	538	303	6.50
Yavapai	54	13	41	873	788	1,661	1,043	957	6.80
Yuma	15	4	11	248	215	463	300	270	6
Total	361	106	255	8,246	7,652	15,898	10,579	9,396	6.34

INDIANS.

The Indians on the various reservations have been quiet throughout the year, and there is every reason to believe that Indian depredations and disturbances of consequence within this Territory are permanently at an end. One of the surprising and gratifying features of the situation is the substantial progress toward civilization which is being made by the Apaches, long considered incorrigible. No longer influenced and led by vicious renegades, they are tractable and are exhibiting proofs of a general desire for advancement. This is especially true of the San Carlos Apaches. The construction of a railroad through their reservation has had manifestly beneficial effects. It is possible to further improve the conditions on that reservation by developing a better water supply in the valley of the San Carlos River and affording opportunities for extensive agriculture—an industry for which many of the tribe are showing a commendable aptitude. Employment on their own farms, seconded by the influence of the Indian schools, would ultimately raise this tribe to a fair degree of civilization.

On the Moqui Reservation, one of the most remote sections of the Territory, smallpox existed in epidemic form during the early part of the year, but the disease was finally brought under control and stamped out.

A few months ago some disputes arose between the Navajo Indians and the white residents of Tuba City, in Coconino County, over the title to certain lands and water. The controversy has been amicably adjusted, however, and a satisfactory arrangement has been made for an extension of the western boundary of the reservation.

The following report upon the Indians of the Territory by Prof. S. M. McCowan, of the Indian school at Phœnix, is interesting and reliable:

The following tables regarding our Indian population, etc., compiled from the latest reports of the various Indian agents, furnish the closest approximation of the facts obtainable and present an interesting epitome of present Indian life:

Agency and tribe.	Population.	Civilization.									
		Citizen's dress.		Indians who can read.	Indians who use enough English for ordinary conversation.	Dwelling houses.		Indian apprentices.	Per cent of subsistence obtained by—		
		Wholly.	In part.			Built for Indians during the year.	Occupied by Indians.		Labor in civilized pursuits.	Hunting, fishing, root gathering, etc.	Government rations.
Colorado River Agency.											
Mohave	683	600	83	180	150	8	70	....	50	.....	50
Mohave at Needles	[1]700	.....	.....	.....	.....	.....	.....	....	.....	.....	.....
Mohave at Fort Mohave	1,000	1,200	200	300	400	.....	.....	....	100	.....	.....
Chimehuivi	150	.....	.....	.....	.....	.....	.....	....	.....	.....	.....
Fort Apache Agency.											
White Mountain Apache	1,838	87	43	30	50	2	2	....	70	10	20
Under industrial teacher.											
Hualapai	598	350	248	60	400	.....	60	....	50	25	25
Yava Supai	261	190	71	60	65	.....	.....	....	75	25	....
Navajo Agency.											
Navajo	20,500	.....	1,000	250	500	75	[1]150	....	100	.....	.....
Moquis Pueblo	2,641	.....	16	28	24	4	67	....	100	.....	.....
Pima Agency.											
Pima	4,280										
Maricopa	340										
Papago	663	6,469	870	188	971	.....	360	7	90	10	....
Papago, nomadic	2,046										
Papago at San Xavier	531	531	.....	12	29	3	.....	....	97	3	....
San Carlos Agency.											
Apache	2,206										
Mohave	697	500	2,400	400	900	.....	.....	5	67	.....	33
Apaches on San Pedro River	300	.....	.....	....	....	.....	.....	....	....	.....	....
Apaches near Mohawk, on Lower Gila River	300	.....	.....	....	....	.....	.....	....	....	....	....

[1] Taken from last year's report.

Agency and tribe.	Religious.						Marital.		Vital.		Criminal	
	Missionaries.		Indian church members.	Church buildings.	Amount contributed by religious and other societies.		Marriages during year.	Divorces during year.	Births.	Deaths.	Indians killed.	
	Male.	Female.			For education.	For church work.					By Indians.	Suicides.
Colorado River Agency.												
Mohave	.....	.....	.....	.....	.....	.....	2	.....	20	26	.....	2
Fort Apache Agency.												
White Mountain Apache	1	.....	.....	.....	.....	$1,217	6	21	41	27	.....	.....
Under industrial teacher.												
Hualapai	.....	.....	.....	.....	$150	215	.....	.....	(1)	22	.....	.....
Yava Supai	.....	.....	.....	.....	.....	.....	.....	.....	10	9	.....	.....
Navajo Agency.												
Navajo	2	3	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
Moquis Pueblo	1	2	.....	.....	.....	.....	.....	.....	350	(1)	1	.....
Pima Agency.												
Pima, Maricopa, Papago, Papago, nomadic	5	2	174	4	20,000	4,100	6	1	154	112	.....	.....
Papago at San Xavier	.....	2	210	1	.....	.....	7	.....	25	23	.....	.....
San Carlos Agency.												
Apache, Mohave	1	.....	.....	.....	.....	.....	.....	.....	46	128	1	.....

Agency and tribe.	Lands.					Crops raised.				
	Cultivated during the year by Indians.	Broken during the year by Indians.	Fences.		Families actually living upon and cultivating lands allotted in severalty.	Wheat.	Oats, barley, and rye.	Corn.	Vegetables.	Hay.
			Acres under.	Made during year.						
Colorado River Agency.	*Acres.*	*Acres.*		*Rods.*		*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons.*
Mohave (on reserve)	181	20	110	415	.....	500	.....	500	50	40
Fort Apache Agency.										
White Mountain Apache	1,218	120	1,218	1,200	.....	.....	300	6,000	30	448
Under industrial teacher.										
Hualapai	150	.....	150	.....	.....	10	.....	400	70	10
Yava Supai	325	50	325	4,200	.....	50	.....	1,000	1,100	6
Navajo Agency.										
Navajo	8,000	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moqui Pueblo	10,000	.....	500	.....	.....	.....	.....	50,000	9,075	.....
Pima Agency.										
Pima, Papago, and Maricopa	3,000	.....	5,000	.....	.....	116,667	1,152	.....	500	100
Papago on San Xavier Reserve	950	50	8,200	650	76	4,000	300	400	130	3,000
San Carlos Agency.										
Apache and Mohave	2,000	75	2,500	300	.....	6,652	13,246	3,000	1,410	83

[1] Not reported.

Agency and tribe.	Butter made.	Miscellaneous products of Indian labor.					
		Lumber sawed.	Wood cut.	Freight transported by Indians with their own teams.		Value of products of Indian labor disposed of.	
				Amount.	Earned by freighting.	To Government.	Otherwise.
Colorado River Agency.	*Pounds.*	*M. ft.*	*Cords.*	*M. lbs.*			
Mohave (on reserve)			600	173	$131	$333	$250
Fort Apache Agency.							
White Mountain Apache		101	2,807			25,785	1,200
Under industrial teacher.							
Hualapai			200			165	1,500
Yava Supai				36	181		4,000
Navajo Agency.							
Navajo		191	50	582	1,421	4,808	
Moqui Pueblo			260	125	1,563		8,000
Pima Agency.							
Pima, Papago, and Maricopa			1,500	24	482		7,692
Papago on San Xavier Reserve	150						118
San Carlos Agency.							
Apache and Mohave			1,218			11,601	12,000

Agency and tribe.	Stock owned by Indians.						Roads.		
	Horses, mules, and burros.	Cattle.	Swine.	Sheep.	Goats.	Domestic fowls.	Made (miles).	Repaired (miles).	Day labor by Indians.
Colorado River Agency.									
Mohave (on reserve)	300	100				600		6	40
Fort Apache Agency.									
White Mountain Apache	4,724	735		1		243	15	5	1,200
Under industrial teacher.									
Hualapai	330					20			
Yava Supai	414	3						9	75
Navajo Agency.									
Navajo		100,500	1,200	1,000,000	250,000		50	150	
Moqui Pueblo	2,200	500		4,000	1,500	500			
Pima Agency.									
Pima, Papago, and Maricopa	7,400	5,000				4,000			
Papago on San Xavier Reserve	245	275				700	¼	2½	280
San Carlos Agency.									
Apache and Mohave	2,955	1,446		45	12	100	10	20	840

School.	How supported.	Capacity.	
		Boarding.	Day.
Colorado River Agency.			
Colorado River boarding	By Government	80	
Fort Mohave training	do	120	
Hualapai Reservation.			
Hualapai day, Hackberry	By Government		60
Hualapai day, Kingman	do		80
Supai Reservation day	do		60
Navajo Agency.			
Navajo boarding	By Government	120	
Little Water day	do		80
Keams Canyon, Moqui boarding	do	90	
Oreiba day	do		40
Polacco day	do		40
Second Mesa day	do		40
Phœnix training	do	600	
Pima Agency.			
Pima boarding	By Government	150	
San Xavier day	Catholic Church		110
San Carlos Agency.			
San Carlos boarding	By Government	100	
Fort Apache Agency.			
Fort Apache boarding	By Government	65	

During the year the Indians have been peaceful and law-abiding. Education is having its natural and inevitable effect on the red man, as is shown by his great improvement in his manner of living, dress, construction of homes, cultivation of the soil, and desire for work that pays. It is extremely gratifying to ride over the great Pima Reservation and see their well-kept farms, all fenced with wire, the stumps cleared out, and scientific irrigation everywhere in evidence. Many of these Indians—and especially is this true of returned Indian students who have homes—have excellent adobe houses of 2 and 3 rooms, floors, doors, and windows, sewing machines, tables, and chairs, pictures on the walls, wells of water near the house, chickens, horses, wagons, buggy, etc. If the Government proceeds with the construction of the water reservoir near Florence the Pima tribe, numbering nearly 5,000 souls, will be permanently self-supporting and can accept their allotments of land in severalty. The Papagoes, living in the southern portion of the Territory, are nomadic of necessity, there being no permanent water supply in their district. If these Indians could be furnished with small bands of sheep or goats (the kind of stock for which their lands are well adapted) they would soon develop into expert grazers, as they are good workers and a worthy people.

The Apaches, erstwhile the wildest and meanest Indians in the Southwest, are taking kindly to stock and agricultural pursuits, and are doing well. While not entirely self-supporting, they could soon be made so by proper guidance. Contrary to general opinion, the reservations of the San Carlos and White Mountain Apaches are extremely rich in natural resources. They are watered by numerous large creeks of pure, sweet water, along which are wide borders of fertile bottom land, capable of maintaining a population many times that of these Indian tribes. Their country is also rich in minerals, grass land, and timber. Many of these Indians are now taking to stock-raising and agriculture, which is the natural vent for their love of outdoor life. If the Apaches are properly guided and controlled there is absolutely no reason why they should long remain dissatisfied, suspicious, and defiant.

The Yumas, Chimhueves, and Mojaves, occupying the fertile bottom lands of the Colorado River, from Yuma to the mouth of the Grand Canyon, have always been self-supporting and peaceful.

The Navajoes, the most numerous, powerful, and conservative tribe in the Territory, remain, as in the past, suspicious and defiant. There is occasional friction between the roving bands of their young men and isolated whites over stock and pasture, but nothing of a serious nature has happened during the year. They

laugh at the white man's laws and scorn his customs, and ask nothing of their white brother except to be let severely alone. If these people could be made to send their children to our best Indian schools it would not be long ere the new ideas, hopes, and aspirations of the returned students would break down the walls of conservatism surrounding this ignorant tribe, and make a way for the advance of enlightened thought, which is the forerunner of intellectual hospitality.

The people of Arizona are pleased by the attention the office of the Interior Department is giving to Indian school matters in the Territory. For years our Indians were almost entirely overlooked and neglected, while vast sums were each year appropriated for Northern Indians no more deserving.

The following observations regarding some of the religious rites of the Moqui Indians are furnished by Dr. J. Miller, of Phœnix, who has devoted considerable time to studying the Pueblo Indians and their customs:

THE PUEBLO INDIANS OF ARIZONA.

Of all the Pueblo Indians in the United States the people of only one tribe are residents of Arizona, viz, the Moquis or Hopi. The name "Moqui" should be discontinued as it is a misnomer and means "dead." The Hopi live in the northeastern part of Arizona, in a district known as the "Province of Tusayan." There are seven villages situated on three mesas. The total population is about 2,500. The linguistic stock with which they are classed is the Shoshone, but this classification is arbitrary and has more conjecture than evidence for a basis.

For many years the Hopi have attracted the attention of the ethnological and archaeological students from all parts of the world. The features of attraction consists entirely in their peculiar religious ceremonies, of which they have many, and all are interesting.

The snake dance, or *Chu-ah-Ti-vi*, is the one ceremony that attracts alike the tourist in search of strange sights, and the scientist in search of knowledge. There is an abundance of literature on this subject, but in none of it is there any attempt to explain its symbolism, or to compare it with any other ancient religious ceremony. It seems that it has been taken for granted that it is a wild, weird ceremony of an uncivilized people, and that it has no meaning; and this is true of many who visit the Hopi and witness the ceremony, which consists of a dance by the antelope and snake priests, the latter dancing with rattlers and other venomous snakes in their mouths and hands. This ceremony lasts about forty minutes, at the conclusion of which the wildest and most exciting scene imaginable is enacted, by the priests depositing all the snakes in one heap, where they are sprinkled with consecrated meal. After this ceremony of consecration each priest gathers in his hands as many snakes as he can carry and runs down the mesa and deposits them on the plain below, free and unharmed. No poisonous effects ever result from the handling of these reptiles.

It has been my good fortune to spend some time, on two occasions, with these people, and during my last visit (August, 1899) to have been honored by being initiated, along with my interpreter, Frank Chuah whia, into the Snake-Antelope Fraternity. By virtue of my initiation and a good interpreter I had exceptional advantages for study and observation, the results of which are briefly stated in this communication.

It has been stated repeatedly that the relation of the rising sun to some object on the distant hills determined the time for the snake dance. Not believing this, I determined to ascertain if possible what it was, and after five days of perseverance I was told by an antelope priest to come to the Kivi at 3 o'clock in the morning and he would show me. I slept at the Kivi and at 3 a. m. he called me, and through my interpreter he told me that it was the conjunction or relation that Orion, the Pleiades, and the Milky Way assumed toward the earth and toward one another during the last days of July, and that the observation was taken in the latter part of the night or the early morning. He stated that these relations occurred but once in a year and that twenty days after this conjunction was the time for holding the public ceremony or snake dance. The observation was taken this year at priest Wi ki's house, there being two chiefs each from the antelope and the snake fraternities.

There is another ceremony celebrated in December of each year, the time for which is determined by the constellation of Orion and the sun. This celebration is known as *Pa-lu-lu-kan*, or the serpent ceremony, the call for which is made when the sun is at the horizon in the east and Orion is at the bottom in the west. Although this ceremony is a part of the ceremonies of the snake-antelope fraternities, it has no relation to the snake dance and is subordinate thereto.

The snake dance dominates all other ceremonies, and is the summer solstitial celebration; the *Pa-lu-lu-kan* is the winter solstitial celebration, leading all ceremonies and celebrations for the latter half of the year.

The Hopi are looked upon by the great majority of white men as being ignorant and uncivilized. It is true that they have lost a great deal of their former knowledge, but they still retain enough to interest the profoundest student. When asked for an explanation as to why they do certain things they reply, "Our fathers did it." But who of the white race has not lost and forgotten the symbolism of his cult? Few of them can explain the astronomical significance of Easter or explain any better than the Hopi the common source of their racial legends.

The Hopi have a calendar system of their own. They have 13 months in the year of 28 days each, making a year of 364 days. These months are named as follows: First, *Kel-mi-ya;* second, *Ka-mui-ya;* third, *Pah-mui-ya;* fourth, *Porwa-mui-ya;* fifth, *Assa-mui-ya;* sixth, *Qui-ya-mui-ya;* seventh, *Ha-ki-ton-mui-ya.* At the end of these seven months they begin again at the beginning, leaving out the seventh month at the end of the year. All of these calculations are based on the changes of the moon. Their weeks are of seven days and are recognized by the changes of the moon, *Mu-ya-uh.* The names of the weeks are: New moon, first quarter, *Mu-ya-ka-ci;* second quarter, *Mu-ya-chung;* third quarter, full moon, *Mu-ya-sap-tu;* fourth quarter, *Mu-ya-chung-u-ma-sulla-lu-la.* They have no enumeration of the years and for this reason they can not give ages or fix dates.

They have tolerably complete legends or myths relating to their religious ceremonies, the relation of which in detail I omit here, and shall make only brief mention of those connected with the snake ceremony, that the interpretation of the symbolism of this peculiar rite may be understood.

Prayers are offered to but two deities except the Great Spirit, or God. These two are *O-mau-uh*, or the rain god, and *Ma-sau-uh*, the god of death and fire. To these, prayer sticks, or prayer bearers, are made and deposited in shrines located in the four cardinal points of the compass. A prayer stick, or pa-hu, is the means of communicating the wishes of the people to the deity. These pa-hus are made in the Ki-vi, which is an underground room in which all secret ceremonies are performed. The pa-hu is there consecrated by smoke, consecrated meal, and prayer. When finished it is deposited in a shrine, where it is supposed to be found by the Deity. Everything connected with the manufacture, consecration, and deposition of these prayer sticks is of the most solemn nature, and strictly ritualistic. The priest, when preparing for this work, disrobes, leaving nothing on except his loin cloth. His hair is taken down and thoroughly brushed. He sits upon his blanket, both in the work of preparing the prayer sticks and at the "sand altar" during the singing of the sixteen songs. The flowing hair, the blanket, the position in which he sits, all symbolize the four days spent with *Ma-sau-uh*, the god of fire and death.

Briefly told, the legend runs thus: When the Antelope Gens (family) was journeying westward in search of a place to live, they camped in the valley between the first and second mesas (table lands), where they now live, where they found some large tracks of a man. The first morning the chief sent out squads to the four cardinal points to hunt for the author of these tracks. At night they returned without any information; the hunt was pursued for four days, and when on the morning of the fifth day they were about to break camp and proceed on their journey they saw the object of their search approaching from the east, or first mesa, in the person of Ma-sau-uh, who spent this and the three following days (making four days) with them, giving instructions and commands. Ceremonial smoking was indulged in, and they all sat upon their blankets, with flowing hair, in the manner described.

The ritualistic work in the Ki-vi is the same each day, except the last two, when the dramatization of *Ti-yo*, the snake hero, and the "snake virgin" takes place at sunrise. This is an exceedingly interesting narrative, the symbolism of which represents the harvest. The rain symbolizes the menstrual epoch and the corn and vines the conception or nine months' gestation from the harvest until the next seed time. During my leisure from work in the Ki-vi other lines were investigated and symbols studied. One of the most important and sacred of these was their son of God, *E-sau-uh.* He was with God when he created the world. Some time after the creation he killed a beautiful virgin, who lay four days in the grave. On the morning of the fifth day she was seen by her mother alive and dressing her hair. The number four, represented by four lines, is a constant symbol with the Hopi. It is found on all decorated articles manufactured by the Hopi. It is used in baptismal rites and in the most sacred ceremonies. Everything is counted by 4, 8, 16, 32, and so on. They have an imperfect tradition of the flood, but do not know the name of the man who had charge of the "big boat." This may be known by the chief of some other *gens* or family, as one

gens holds traditions unknown by the member of another *gens*. We have been taught to look upon the Eastern Continent as the birthplace of man. The Mayas of Yucatan have a tradition that the Nagas, their wise man, or serpent men, went to the East to teach the astronomy, astrology, and philosophy of the West. The Hopi have a tradition that their wise men went to the East for the same purpose, and relate a prophecy that "the white man would again return to them." Sidi Mahommed Te-eiber, a Hindu philosopher, now living in this country, tells me that in India they have a sect who have a snake dance almost identical with the ceremony as given by the Hopi. In both cases the object of the ceremony is the same, namely, a prolonged prayer or invocation for rain, good crops, increase in population, wealth, and general well-being. In the temples of Hindustan, he says, the priests have kept records for twelve thousand years. In these records is to be found a record of this tradition. If this be true (and it seems to be a strange coincidence if not), it would establish the Hopi as a people of very great antiquity.

THE YAVA SUPAIS OF CATARACT CANYON.

By Maj. J. H. McCLINTOCK.

One of the most important of the scenic parts of the Grand Canyon region is the valley of Cataract Creek, lying north of Ash Fork. It is a mere cleft, thousands of feet deep, cut in a juniper-clad plain, drained by a stream that sinks deeper and deeper until its waters at last mingle with those of the Colorado in the wildest part of that river's mighty gorge. The valley's base, to an unknown depth, is a deposit of petrified vegetation. The creek, heading in the mountains near Williams, sinks, to reappear in the canyon a giant spring, with a steady flow approximating 50,000 gallons. In its underground course of more than 60 miles it must have leached away caverns of great extent, for its waters have gathered all the lime and silica they can carry in solution. These mineral elements are to a degree deposited after the stream again finds the light. The twig that is laved by the clear running stream is soon transformed to stone, its woody fiber washed away, though the form remains. There are cataracts of wondrous beauty, where the stream falls over cliffs of its own making.

At Bridal Veil Falls, 144 feet high, the water descends in a lace-like film 100 feet broad. Below, a few miles, are Mooney Falls, where the water in closest compass leaps 250 feet to a churning pool beneath. Under each of the falls are networks of caves, full of nature's rarest carvings, hung with dripping draperies of fossilized fern and moss.

Though the valley is only a stone's throw wide, it is the home of an Indian tribe numbering 300 souls, the Yava Supais.

The tribesmen are of the original Apache stock and speak a dialect of the Apache tongue. Yet they are peaceful and hospitable. They have cornfields and melon patches and apricot and peach orchards, all irrigated from the ever-living creek, and of the nation's bounty receive nothing save schooling for their children. On the mesa above they graze their herds of ponies. Among the tribes of the north they are separate and alone, proud of their independence and well content in their isolation. Yet, in the fall time, down the three trails that lead into the valley, come welcomed Navajoes, Moquis, and Hualpais, to trade with the men for dried fruit and ponies, and with the women for woven baskets, the best in the southwest.

The canyon is now difficult of access, yet the visitor is well repaid for his arduous journey. It has been called the "Yosemite of the Southwest." The title is suggestive, though little more. Its scenic features are titanic, its natural marvels nowhere else to be found.

ETHNOLOGY AND ARCHÆOLOGY.

I renew the statements and recommendations of my last annual report on the subject, as follows:

Arizona presents far more profitable and interesting fields for the scientist and ethnological explorer than any other part of the country. Evidences of a large population, now lost to history, or even tradition, exist in many localities; ruins of immense buildings and of cities which once were occupied by hundreds of thousands of people, prehistoric waterways, etc., furnish good reason for the belief that quite a high state of civilization had been reached by these people who are

SCENE ON SUPAI TRAIL, CATARACT CREEK, COCONINO COUNTY.

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CAPITOL GROUNDS.

gone and whose record is lost. There is also much to be learned of the living, especially the Moquis, Zunis, and other Pueblo Indians of northeastern Arizona and northwestern New Mexico. Similarities of language are declared to exist between these people and the Asiatic races. The art of mummifying is unquestionably known to the Moqui priests. Hieroglyphics are found in all respects like those of Egypt, and within the inner circles of Moqui secrecy I am reliably informed that Masonic signs are inscribed upon the emblems and insignia of the priests. All this is strange and interesting and deserves more searching investigation. I believe that startling discoveries can and will be made here affecting the history of the human race, and I strongly recommend that an ethnological commission be appointed, to consist of the ablest scientists whose services can be obtained by the Government, for the purpose of thorough, careful, and extended ethnological and archæological research in this section of the country. Liberal appropriation should be made to defray the expenses of the commission, and ample time should be given, possibly extending over a number of years, for the prosecution of the work. I am positive that the knowledge gained by such action would more than justify the expenditure. I think it will be more productive to science to explore and excavate here than in foreign countries.

PUBLIC BUILDINGS.

The public buildings of Arizona comprise the capitol, situated at Phœnix; the Territorial university, at Tucson; the Territorial prison, at Yuma; the asylum for the insane, at Phœnix, and the normal-school buildings, at Tempe and at Flagstaff.

The capitol building is under construction, and will be ready for occupancy early in the coming year. Funds for the expense of construction were provided by a Territorial bond issue of $100,000, ratified by Congress, to which was added an appropriation by the legislative assembly, making the total cost of the completed structure approximately $130,000. The building is 184 by 84 feet in size, and 4 stories in height. The first story is of granite, and the superstructure of tufa stone—all Arizona products.

The rotunda is 44 feet in diameter, and extends from the ground floor through all the stories of the building to a height of 78 feet, being surmounted by a dome which is crowned by a statue of Liberty 16 feet in height.

The dimensions of the halls provided for the legislative bodies are 38 by 36 feet, and special attention has been given to the acoustic properties of these halls and to their ventilation. The gallery space in each hall has a seating capacity of between 200 and 300, and surrounding the halls will be the committee and other rooms required for the accommodation of the assembly.

Special offices are also provided for the governor and other Territorial officers.

The construction of the building is under the supervision of a capitol commission composed of three members, the president of the commission, Mr. E. B. Gage, residing at Prescott, and the other two members, Mr. Walter Talbot, and Mr. Frank Parker, the secretary, residing at Phœnix.

The capitol grounds comprise 10 acres lying 1 mile west of the business section of Phœnix. The design on the east side of the grounds is geometrical in style, and very attractive. The lawns on the west half of the grounds have not been completed. The principal deciduous trees with which the grounds are ornamented are the Arizona ash, the Russian mulberry, the umbrella tree, the Mexican chino, the eucalyptus, and a few elms. Among the palms are the California fan and date palms, the blue and Japanese fans, and a large variety of yuccas. The shrubs comprise specimens of Australian, Chinese,

Japanese, European, and native varieties, and there is a fine collection of cacti and a fair one of roses. When the work in contemplation has been carried out, the capitol grounds will form an admirable setting for the new building.

The Territorial prison buildings are inclosed by a wall, the front and rear lengths of which are 290 feet, the sides being 321 feet long. This does not include the women's department at the southwest corner, which is about 30 by 30 feet. The walls are 20 feet high, 8 feet thick at the bottom and 5 feet at the top, which is surmounted by a cement cap and coping. A guardhouse of frame construction and shingle roof is situated on each corner of the walls, two of the houses being 2 stories in height.

Inside the walls are the cell house, 134 feet long by 65 feet, built of rock and iron; a building of adobe, 167 feet long by 34 feet in width, comprising the engine room, boiler room, tailor and shoe shops, laundry, bath house, and library, and the kitchen and dining room building, also of adobe, 110 by 21 feet. The dining room is 75 feet long and 18 feet wide inside. A covered corridor connects this building with the east end of the cell house and with the office of the assistant superintendent.

Outside the walls are the office of the superintendent, the same building, 1 story in height and 38 by 38 feet in size, being also used for a storehouse; and a 2-story building for the sleeping accommodations of the guards.

The Insane Asylum consists of a main central building of brick, and 2 wings of 2 stories and basement. The main building is 100 feet long and 50 feet wide. A hall 12 feet in width runs the entire length of the building. On each side of the central structure there is a wing 100 feet long by 40 feet in width, separated from the main building by a vestibule 16 feet wide. The outbuildings consist of a general dining room, 100 by 40 feet, with 2 wings, each 16 by 20 feet. A building containing the engines, boilers, dynamos, and pumping plant, and the stables, carpenter shop, blacksmith and paint shops, comprise the other buildings of importance. The ornamental grounds in front of the asylum contain 4 acres tastefully stocked with trees, semitropical flowers, plants, and palms. The asylum is situated 2 miles east of the business section of Phœnix.

Descriptions of the University and Normal School buildings will be found under the head of "Education."

All of the public buildings have been constructed at Territorial expense, no aid having been extended by the General Government.

THE TERRITORIAL PRISON.

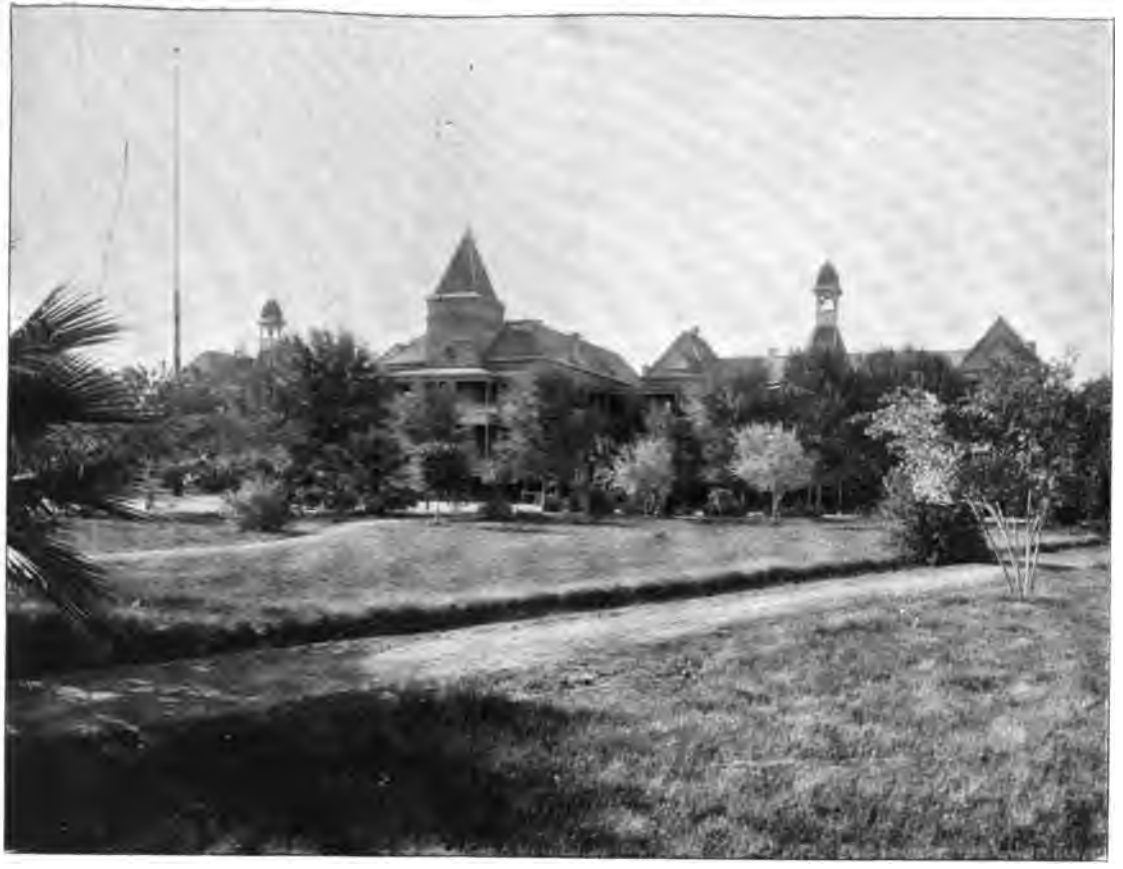
Following are extracts from the semiannual report of the superintendent of the Territorial prison for the fiscal year ending June 30, 1899:

STATISTICAL.

At the close of the year ending December 31, 1898, there were 214 male prisoners here, and on June 30, 1899, there were 218 in confinement. Forty additional convicts have been received, and 36 discharged. During the six months covered by this report there were 3 escapes, 2 of whom were recaptured at Aztec, and returned to prison.

FINANCIAL.

The gross expenditures for said six months were $23,875.29, and the receipts and earnings $2,801.13, thus leaving the net expenses $21,074.16. The average number of prisoners was 216, and the net daily per capita cost $53\frac{2}{10}$ cents.



INSANE ASYLUM, PHŒNIX.

UNIV. OF ARIZ.

REPAIRS AND IMPROVEMENTS.

The repairs and improvements made in said time were as follows: The prison buildings have been thoroughly renovated throughout, and whitewashed, and all necessary repairing done. The roofs of all the buildings, within and without the walls, have been repainted as a protection against the weather. A cement floor has been put in the room occupied as an adjunct to the hospital, and a new library and bath house have been built. The former is a splendid building, 49 by 30 feet, well lighted and ventilated. This building was a necessity, for the reason that during inclement weather there was no place of shelter for the men outside of their cells. The building is of adobe with corrugated iron roof, redwood ceiling, and cement floor. The new bathroom adjoins the library. It is under the same roof, and is nearly as well finished. The old bathroom adjoined the laundry, and on completion of the new one the intervening wall was taken out, and the bath-room added to the laundry. This additional space was much needed for washtubs and ironing boards. In due time the old library will be converted into cells, of which the prison is much in need.

THE PRISON FARM.

An effort at prison farming was made during the spring months, and a large acreage of vegetables for prison use was planted. All, however, were destroyed by an overflow of the Colorado River which submerged the island under 2 to 4 feet of water. When the flood subsides we will extensively replant.

A large force of men is being continually employed on the hill south of the prison. When sufficient excavation has been made, an additional yard, 100 feet square, will be added, together with probably eight or ten additional cells.

DISCIPLINE.

The discipline of the prison is good, there being but few minor infractions of the law. Of the 40 prisoners received during the six months covered by this report, 12 are Mexicans, 25 Americans, 2 negroes, and 1 Indian. Twenty-six have a sentence of 5 years or under; 7 of over 5 and under 10; 2 over 10 and under 20; and 4 for life.

Of the prisoners received, Mohave County furnished 1, Gila 2, Yuma 3; Pima, Graham, and Yavapai 5 each; Cochise 6, Maricopa 11, and 2 by transfer from prisons outside of the Territory.

Of the 36 prisoners discharged, 8 were by simple expiration of sentence; 3 by expiration of sentence, with wood-time credit; 9 by expiration of sentence, with canal-time credit; 6 by expiration of sentence, with wood and canal time credits; 4 by death: 2 by order of court; 2 by pardon; 1 by parole; and 1 by escape.

Of the 218 prisoners in confinement June 30, 1899, all are male; 104 white, 98 Mexicans, 8 negroes, 8 Indians, and 2 Chinamen; and of which total number 14 are United States prisoners. The average daily number, 216.

FINANCIAL.

From the following table will be found the monthly and total segregated expense:

	January.	February.	March.	April.	May.	June.	Total.
Salaries	$725.00	$725.00	$724.96	$725.00	$725.00	$725.00	$4,349.96
Wages	1,082.26	1,040.00	1,037.45	1,008.88	1,046.84	1,044.30	6,204.73
Provisions	1,135.25	1,008.85	1,076.30	1,649.27	1,280.08	1,196.72	7,346.47
Improvements	43.37	34.32	66.26	119.82	88.18	520.64	872.59
Clothing and bedding	101.58	47.80	84.74	52.26	44.22	69.66	400.26
Hospital	129.02	12.25	23.58	99.03	11.55	9.82	285.25
Shoe shop	35.09	61.54	18.09	83.73	70.77	78.20	347.42
Tailor shop	189.15	24.62	68.98	52.73	63.49	76.53	475.50
Stationery and printing	21.65	7.19	111.33	4.28	12.52	79.08	236.05
Water, fuel, and lights	615.75	318.66	292.93	196.01	408.52	151.31	1,983.15
Stable and grounds	36.42	54.44	36.76	56.43	206.57	24.43	412.15
Miscellaneous	142.30	32.72	143.25	395.28	126.65	121.63	961.83
Total	4,206.84	3,367.39	3,684.63	4,437.72	4,081.39	4,097.32	23,875.29

RECEIPTS AND EARNINGS.

The receipts and earnings for the six months covered by this report are as follows:

Maintenance of United States prisoners	$1,973.00
Deductions from prisoners' manufactures	139.89
Sale of blue dirt	26.25
Sale of adobes	39.75
Sale of rock	350.06
Prisoners' labor	103.08
Sale of old iron	37.10
Sale of power to Yuma Water and Light Co	132.00
Total	2,801.13

LEGISLATION.

The twentieth legislative assembly convened on January 16 of this year and adjourned on March 16. The following are among the more important laws enacted:

An act appropriating the necessary funds for completing the capitol building; an act exempting, under certain restrictions, reservoirs and canals hereafter constructed from taxation for fifteen years; an act providing for a commission to codify the laws of the Territory; an act raising the "age of consent" from 14 to 17 years; an act creating the county of Santa Cruz; an act providing for six months' residence as a qualification for voters; an act requiring the payment of a poll tax by electors before they shall be entitled to have their names entered upon the register; an act limiting homestead values exempt from execution to the sum of $2,500, and personal property to a value of $500; an act declaring the property acquired by husband and wife to be common property; an act creating a second normal school; an act providing for free libraries in cities, and a compulsory school law.

JUDICIARY.

The judicial system of the Territory is unsatisfactory, and it is believed that Congress, in providing for Territorial courts, was building for sparsely settled communities during the Territorial condition, and did not make the judicial plan sufficiently comprehensive for a large population. At present the judiciary of Arizona consists of a chief justice and three associate justices appointed by the President. There are no county courts as such, except courts of probate with limited jurisdiction. The associate justices of the supreme court, including the chief justice, each have districts comprising several counties in which they hold court twice a year, as follows:

First district (Judge George R. Davis): The counties of Pima, Cochise, and Santa Cruz.

Second district (Judge Fletcher M. Doan): The counties of Graham, Gila, and Pinal.

Third district (Chief Justice Webster Street): The counties of Maricopa and Yuma.

Fourth district (Judge Richard E. Sloan): The counties of Yavapai, Mohave, Coconino, Navajo, and Apache.

There is a clerk and court commissioner in each county.

The Federal statutes are construed by some to mean that these judges designated as "associate judges of the supreme court of Ari-

zona" are only required to hold court at one place within the districts to which they are assigned, for the trial of United States and Territorial cases, and that the Territory, through its legislature, should provide county courts with jurisdiction coordinate with the district judges, and that the associate justices should only be required to transact their United States and district business, and sit as the supreme court of the Territory.

Be this as it may, whether the meaning of the statute is not sufficiently clear, or whether custom and circumstances have improperly developed these conditions, the judges now are compelled to serve as United States district judges, county judges, and judges of the supreme court.

In the hearing of cases before the supreme court, the judge before whom the case under consideration was tried in the court below is disqualified from participating, yet it is contended that it would be better if there were a supreme court distinctively as such, so that the judges could have no connection with trials had in the lower courts.

The judges are very poorly compensated for the work they have to do, and no provision is made by law to defray their actual expenses while traveling to and from the different counties in which they hold court and their living expenses while necessarily away from home on court business.

The fourth judicial circuit, containing five counties in which court must be held twice each year, extends entirely across the Territory from east to west and comprises a greater area than the State of New York. The judge is kept constantly busy, exclusive of his supreme court work, and the same is true, comparatively, of the other judicial districts. Their pay of $3,000 per year is absurdly inadequate. The judges should receive at least $5,000 per year; able jurists of high character, learned in the law, should not be expected to give up the lucrative practice of their profession for the honorable and very responsible position of associate justice of the supreme court in the Territory at an unreasonably low salary. It is clear to me that the interests of the Government and the people would be best served by the creation of a fifth judicial district in Arizona, and a proper increase in the salary of the judges.

The judges of this Territory are men of the highest ability and character, and command fully the respect and esteem of the people.

LABOR.

As previously reported, this question has never materially disturbed affairs in Arizona. Temporary strikes have in a few instances occurred upon the great transportation lines, but they have seldom been serious in their nature and have, with one exception, been quickly settled. Arizona is entirely free from contention caused by disagreements between capital and labor. Liberal wages are paid and labor is usually contented. Americans are principally employed. There are very few foreigners in the Territory not naturalized. A few Mexicans and some Indians work as section hands on railroads, and Chinese and Japanese are employed as house servants, but a very large percentage of our labor is American, especially in the mines.

Laborers in Arizona are, as a rule, intelligent and law abiding. The supply seems to equal the demand, and few men who care to work need be idle here.

MINING.

For the mining industry the past year has been the most prosperous in the history of the Territory, and the year's record clearly demonstrates that Arizona is sure to become the greatest and most profitable mining section in the country. In former years the phenomenal production of a few great copper, gold, and silver mines gave the Territory a reputation as a producer of precious metals, but the fact that Arizona possesses incalculable mineral wealth has had tardy recognition. The Territory has never experienced a mining "boom;" the development of this industry has been slow but sure and substantial. Inaccessibility and lack of transportation facilities have been the principal drawbacks. These obstacles have now been largely overcome by the construction of railroads into the most important mining districts. The mistaken idea has prevailed to some extent, also, that Arizona's mines do not "go down," and more or less prejudice has been created against the Territory on that account. This erroneous theory has been entirely exploded. Deep mining has proven that values frequently increase in depth. In the Congress mine, at a depth of 2,500 feet, the ore shows great value and strength. In the Gladiator and other mines in the Bradshaw Mountains values increase with depth, and it is not improbable that deeper mines will be worked in Arizona than on the famous Comstock lode of Nevada. During the past year the attention of investors and prospectors outside of the Territory has been enlisted as never before, and sales and contracts for sales have been numerous. There has been a notable increase in the production of gold, which will be still more pronounced during the coming year. One of the remarkable features has been the revival in silver mining. The building of new railroads has enabled the owners of silver properties to make shipment of ore at a profit, and in some sections of the Territory silver mining is active and profitable.

The prominence which Arizona has achieved as a steady producer of the precious metals, and the certainty that the production will be augmented in the future, justify me in urging that a Government assay office and branch mint be established in the Territory. Assay offices are generally conducted at a profit to the Government and there is every reason to believe that such would be the case with an office established in Arizona, while the substantial encouragement thus held out to the mining industry of the Territory would be very beneficial.

In copper mining, in the increased capacity of copper smelters, in the location and development of new discoveries, and in the influx of eastern capital for the purchase of copper mines and prospects, the year has been remarkable. The output of copper has increased at a marvelous rate, and if, as there is every reason to expect, this rate of increase is maintained, Arizona in a very few years will lead the United States in copper production. One of the features peculiar to Arizona copper mines is the continuity of the ore bodies.

The almost fabulous production of some of Arizona's great copper mines, and the remarkable success of mining ventures in this Territory, together with the high price of copper and the active trading in copper stocks, have afforded opportunities for speculators and stock jobbers to unload upon overcredulous Eastern investors a great deal of worthless mining stock, and companies have been organized upon quite a number of undeveloped prospects in Arizona, and capitalized far beyond any reasonable valuation, and through much advertising

and extravagant misrepresentations have sold stock throughout the Eastern States, amounting, I am told, in par value, to several millions of dollars and upon which no return whatever can be reasonably expected. No doubt such methods are more or less practiced always where mining is active and prosperous, yet the abuses had become so notorious, and so many inquiries and complaints were made to the executive office, that, to protect investors, and in behalf of honest and legitimate mining in Arizona, I felt it my duty in June of this year to issue a circular note of warning to the public on the subject. The immediate responses of approval which came from all over the country demonstrated the salutary effect of this action. The mineral wealth of Arizona is immeasurable, and honest mining is almost always a sure road to fortune.

Particular attention is invited to the report of the Territorial geologist, in which the mining industry of Arizona is ably and exhaustively treated. The reports from counties also contain valuable information in regard to mining.

[Report of Prof. W. P. Blake, territorial geologist.]

HISTORICAL SKETCH OF MINING IN ARIZONA.

THE PREHISTORIC PERIOD.

The prehistoric races who occupied the valleys and hills of Arizona, the builders of the great houses and now ruined cities, were the earliest miners. Evidences of their work have been found in all directions. The croppings of our chief mineral deposits, when first found by white men, were seen to have been dug into and stripped of their contents to a considerable extent at some remote period and by unknown hands. It would seem that the ancient prospectors and miners sought for materials for ornament and decoration rather than for the more useful materials and metals. At the croppings of the ores known to us as the United Verde, for example, the aborigines dug for the brilliant red, blue, and green oxides and carbonates of copper for paint. At other places they sought for the brilliant glancing scales of hematite, for this ore has been found in the ruins of their dwellings.

At two or more of the localities of the turquoise with which Arizona Territory is favored the lost races mined extensively for this gem under its ancient and more appropriate name of chalchihuitl. And in getting out this precious metal, of more value to them than gold, they dug shafts and tunnels, using stone implements in profusion, as shown not only at Turquoise Mountain, in Mohave County, but at the prehistoric mine in the Dragoon Mountains.

At the Cerrillos, in New Mexico, 25 miles from Santa Fe, immense excavations were made to secure this gem, which it appears was sought for and mined from Mexico to Santa Fe. Fragments of chalchihuitl and small objects carved in it, and ornaments overlaid with a mosaic of turquoise tesseræ are found in the ancient ruins of Arizona, thus giving evidence of the racial unity of the ancient miners and the remnants of the Indian tribes of the present day.

Lead mines were not neglected. When the veins of lead ore at Castle Dome, upon the Colorado, were first seen by our modern prospectors it was evident that the ores near to the surface had been carried away; the croppings had been stripped; deep trenches along the croppings, partly filled in with débris and overgrown by the mesquite and palo-verde, gave abundant evidence of the industry of unknown miners. So, also, at the Montezuma lead mine, between Phœnix and the Vulture, there were ancient excavations showing a considerable extraction of ore, and in these excavations the prehistoric miners left their stone tools, such as hammers, sledges, and mauls. This fact should dispose of the theory held by some that this early work was done by the Padres or Spanish explorers.

We should not overlook the early aboriginal utilization of the waters of the Salt River and the Gila by the successful diversion of these streams over the high mesas through canals and acequias, showing great boldness of conception and engineering skill of a high order.

SPANISH COLONIAL PERIOD.

The early colonists of Mexico were stimulated and incited to conquest and occupation by the mineral riches of the country. They were alive to the reputed wealth of the then unknown northern regions and many expeditions were organized for the exploration of northern Mexico, including the regions since known to us as Sonora, New Mexico, and Arizona. A confirmation of the general belief of the existence of great riches in gold, silver, and precious stones at the north was found in the reports brought in by Cabeza de Vaca. This intrepid explorer, who accompanied Narveaz to Florida in 1538, and was one of the five men deserted there, made his way westward across the Mississippi and the Rio Grande and then southward to the colonies of his countrymen in Mexico. The negro Estevan was one of his companions on this long, weary march. They are said to have reached on their western journey the Lundi and Moquis villages, and to have carried back to Culiacan, in Sinaloa, exciting accounts of the great wealth of the region in silver, gold, and precious stones. Hamilton writes that they were the first foreigners to set foot on what is now Arizona soil. Their reports confirmed the general opinion of the great wealth of the Seven Cities of Cibola. The narrative of Castenada expressly states that in the year 1530 Nuno de Guzman had an Indian named Tejo in his service who was the son of a trader, who, in the boy's youth, had made journeys into the back country with fine feathers to trade, and returning had brought back a large amount of gold and silver. Tejo had seen seven very large towns which had streets of workers in silver.

A new expedition was organized under the leadership of Friar Marcos to penetrate the northern regions even to the Seven Cities of Cibola, and the negro Estevan was selected as the guide. This Estevan gave the good friars great anxiety by his grasping greed for turquoises and other valuables and his conduct with the Indian women. He constantly pushed ahead of the friars, and, arriving at one of the Zuni villages, was imprisoned and put to death, whereupon Friar Marcos hastened back to Mexico without seeing the treasure vaults of the Seven Cities, where the women were said to wear gold beads and the men golden girdles.

In the year 1582 Antonio de Espejo led an expedition to explore the region to the north known to the Spaniards as Arizuma. Traveling up the Rio Grande, he named the country Nuevo Mexico. Turning westward, he visited the Zunis and Moquis. Forty-five leagues southwest of the Moquis villages he discovered rich silver ore, said by Hamilton to be the first authentic account of the finding of precious metals within the limits of Arizona, and in his opinion the locality must have been in the region now known as the Black Hills, on the Rio Verde. Espejo retraced his steps to Zuni, and returned to Mexico by way of the Pecos Valley in 1583. It is related that among those who took up their abode in New Mexico were three Flemish men, but citizens of Mexico, who devoted their attention to mining, and discovered many new mines. Being much encouraged, they returned to Mexico for competent miners and refiners, and for machinery with which to work the mines. But when they returned the Spaniards, being opposed to the enterprise, set fire to the machinery and destroyed it. In the year 1599 Onate, having heard much of the great city of Quivira, made a trip to it, accompanied by 80 soldiers and Father Francisco de Velasco, then the commissary of the province, and a secular friar named Pedro Vergara. Onate was satisfied that the country abounded in gold, which the Indians refined by a process they called "tejas."

When Onate returned to Mexico he took with him two Indian boys whom he had made prisoners in one of the fights with the Indians. According to Davis, one of these boys built a furnace in the City of Mexico for refining gold, and showed a surprising degree of skill in this art. The silversmiths tried to deceive him with gilded and spurious articles, but he readily distinguished between the true and the false.

He was taken to Spain and presented to Philip III and the court. He made a map of his native country, and gave such a glowing account of its wealth in gold that the King gave orders for an expedition of a thousand explorers, but the projected enterprise was soon abandoned.

ESTABLISHMENT OF MISSIONS.

About one hundred years later, or in 1687, the Jesuit missionaries, Fathers Kino and Salvatiera, established the first mission within the region now known as Arizona. Thirty years later there were nine missions, all in a prosperous condition. The converts were mostly from the Pimas, who took the name of "Papago" (baptised). But the missions were subject to constant raids from the Apaches, who

doubtless interfered greatly with mining, and in the year 1757 there was an uprising of the Pimas, with the destruction of several of the missions and murders of the priests. This disaster was followed in 1765 by a royal decree of expulsion of the Jesuit Fathers and the substitution of eight Franciscan friars in 1768.

We may conclude that during the long period between the disastrous ending of the expedition of Friar Marcos and the colonization of southern Sonora prospecting for precious metals was actively carried on, and possibly some of the work upon the Castle Dome lead veins and at other places in Sonora and Arizona was done by these early adventurers from New Spain. The many places in the region where remains of the Mexican style of furnace are found, as well as piles of slag, and often of litharge, bear witness to the enterprise and industry of these early metallurgists.

Native Silver.

Near the beginning of the eighteenth century reports reached the City of Mexico of the discovery of great masses of native silver in the northern regions, in the district of Arizona, a locality since known to us as the Planchas de Plata, and not far from our present international boundary line, and between Nogales and Sasabi. Owing to the remoteness of the region, it is fair to presume that much of this silver was dug and taken away without the payment of the King's fifth, for we find that a prosecution was instituted by the royal fiscal against the discoverers of Arizona for having defrauded the royal treasury of the duties payable upon the masses of pure silver found there. A search made by the Mexican Government in the vice-regal archives nearly a century later showed that correspondence on the subject between the viceroy and the Court of Spain took place in the year 1736.

Philip the Fifth, of Spain, on the 28th of May, 1741, issued a decree terminating the prosecution, and declaring the district of Arizona to be royal property, as a "criadero de plata:" a place in which silver was created. This decree recited that the weight of the balls, sheets, and other masses of silver, "bolas, planchas, y otras piezas de plata," amounted in weight to 165 arrobas, 8 pounds, in all 4,033 pounds. One piece weighed 2,700 pounds and another 11 arrobas, upon which duties had been placed by one Don Domingo Asmendi. The King thought that this piece at least should have been sent to Madrid "como cosa especial." It is interesting to note this early official use of the name Arizona, which, according to Mowry, is of Aztec origin and was originally written Arizuma.

Gadsden Purchase.

Much interesting information upon the early history of the region of the Gadsden Purchase was obtained from the archives of the Mexican Government by Capt. Charles P. Stone, of the United States Army. From a summarized statement of this information, published in the article upon silver and copper mining in Arizona in the Mining Magazine (second series, vol. 1, pp. 1-15) in 1859, the following is extracted:

As early as 1687 a Jesuit missionary from the province of Sonora, which in its southern portion bore already the impress of Spanish civilization, descended the valley of the Santa Cruz River to the Gila, which he followed to its mouth, now the site of Yuma. From this point he ascended the valley of the Gila and of the Salinas or Salt River and its branches, and reached the Mimbres and probably the Rio Grande and the Merilla Valley. Filled with the enthusiasm of his order he procured authority from the head of the order in Mexico and established missions and settlements at every available point. In a report to the viceroy of Spain, made during the early settlement of the province, we find the following statement: "A scientific exploration of Sonora with reference to mineralogy along with the introduction of families will lead to a discovery of gold and silver so marvelous that the result will be such as has never yet been seen in the world." A map of this and the adjoining territories was drawn by some of the Jesuit missionaries in 1757 and dedicated to the King of Spain.

The reports of the immense mineral wealth of the new country made by the Jesuits induced a rapid settlement. The sites of more than fifty towns and villages, some of them of considerable size, are indicated on the map. Then settlements and missions were founded by the side of streams and springs in fertile valleys which produced luxuriant crops of corn and beans, and in many parts grapes and other foreign fruits were cultivated. In the western part of the territory (Sonora) were the missions of St. Pierre, St. Paul, St. Matthias, St. Simond, St. Francisco Merci, the ranches of Eau Cheri of San Xavier del Bac Santiago,

San Cayetano, and San Felepe, the towns of Tucson, Tubac Reyes, San Augusta, and many others. Upon the San Pedro River were the missions of St. Mark, San Salvador, Santa Cruz, and the towns of Quidura, Rasario, San Fernando, and others. To the eastward some small settlements were found in the Valle del Sanz on the Mimbres, at the copper mines north of the Mimbres; and to the south the immense grazing and stock-raising establishment of San Bernadino. The Indians in the vicinity of the missions were reduced first to obedience by the Jesuits and then to slavery by the Spaniards.

Apache Raids.

The missions and settlements were repeatedly destroyed by the Apaches, and the priests or settlers massacred or driven off. The Indians, at length thoroughly cowered by the cruelties of the Spaniards, by whom they were deprived of their liberty, forced to labor in the silver mines with inadequate food, and barbarously treated, finally were joined with the tribes which had never been subdued and gradually drove out or killed their oppressors. This was the general uprising of the year 1680. The attempts at civilization disappeared before the devastation of the savages, and in place of the thriving settlements there were blackened ruins and deserted mines.

From the year 1757 to 1820 the Spaniards and Mexicans continued to work many valuable mines near Barbacera. The ancient records mention many silver mines, most of which contained some gold. Among them were the Dolores, San Antonio, Casa Grande, Cabrisa, San Juan Batista, Santa Ana (which was worked to a depth of 360 feet), Rosario, Cata de Agua, Quadalupe, Corilla, Prieta, Santa Catarina Guzopa, Hurstano, Arpa, Descubridora, Nacosari, Arguage, Churinababi, Huacal, Pinal, and a great number of others.

From the notes and the map already mentioned, dated 1757, found and copied by the late Gen. Charles P. Stone, in the City of Mexico, it appears more than 100 silver and gold mines were worked in the northern provinces with great success by the Spaniards.

These discoveries then and since have added largely to the prestige of Arizona as a land of fabulous wealth, especially in silver. Very little appears to have been put on record in those early days of its wealth of gold not only in placers but in veins. Mexico, also, was regarded as essentially a silver-bearing country, and silver at that time was less common and more sought for than gold. The silvery reputation of Arizona has since been fully sustained by such mines as the Tiger, the Stonewall Jackson, at Globe, with its nuggets of native silver, and by the Silver King at Pinal; the great mines of Tombstone, Cochise County, and the White Hills, Mohave County: but nearly all these mines are now idle. The production of silver has diminished, but the production of gold has been more than correspondingly increased.

AMERICAN OCCUPATION.

It was the fame of New Mexico and Arizona as a land of marvels and hidden wealth that appears to have drawn Humboldt northward from Mexico at the beginning of this nineteenth century. The people on the eve of revolution and independence of Spain do not appear to have been very actively engaged in exploring and developing the far-off mining regions of Sonora and New Mexico. Even Ward, who traveled extensively among the chief mining districts of Mexico in 1825, failed to reach the northern provinces or to give any satisfactory systematized account of the condition of mining at that time north of Chihuahua. A few desultory notices of the mines of Upper Sonora by Colonel Bourne are appended to one of the volumes. The remoteness of the region and continual incursions of the savages prevented any systematic and regular working of mines beyond the immediate vicinity of the settlements.

The discovery of gold upon the American River in California in 1848 marks a most important era in the history of mining in Arizona. The Territory, then a part of New Mexico, lay directly in the path of the gold seekers, not only from the Atlantic States, but from Mexico and Sonora. Mines in Sonora were deserted and the road into California by way of Yuma was crowded with Mexican miners and their families bound for the New Eldorado. The thousands who pressed westward across the desert-like stretches along the Gila gave little heed to the riches immediately about them, and mining in Arizona and in Sonora was long overshadowed by the marvelous development of California. New Mexico was ceded to the United States in 1848; southern Arizona, south of the Gila, was then Mexican territory. The Gadsden Purchase was perfected in December, 1853.

The work of the United States and Mexican Boundary Commission during the years from 1850 to 1853 and the explorations of Emory and of Bartlett greatly stimulated the interest in this then comparatively unknown land. So, also, the explorations in search of a good route for a transcontinental road largely added to our knowledge of New Mexico and promoted the development of Arizona. The reconnoissance of A. B. Gray should also be mentioned as one of the important contributions to the description of the country from San Diego to the Gulf of Mexico.

The overland mail route, commonly known as the Butterfield route, was established in 1858. This gave access to the before almost inaccessible interior and greatly promoted immigration and the development of the mineral resources of the region.

Exploration of Southern Arizona.

Upon the acquisition of the country under the Gadsden treaty active exploration of the mineral wealth of southern Arizona by citizens of the United States commenced.

About the years 1855–1857 the best known mining localities in the Gadsden Purchase were at Arivaca (also anciently famous as Aribac), Sopori, the Arizona Mountains, the Sante Rita Range, the Cerro Colorado, the region about Tubac, the Del Ajo or Arizona copper mines, the Fadronia copper mine, and the Gila River copper mines. As early as 1820 the Mines Cobre de la Slata, near Fort Webstermouth, of the Gila, were worked to great advantage, and so rich was the ore that it paid for transportation on mule back more than a thousand miles to the City of Mexico.

In the month of March, 1856, a party of gentlemen who had spent several years in Sonora and the Gadsden Purchase formed an association in Cincinnati, Ohio, for the purpose of sending out a small party to secure by purchase or discovery one or more of the old deserted mining ranches. Col. Charles D. Posten, of Kentucky, with Mr. Hermann Ehrenberg and Mr. Frederic Brunckow, mining engineer, and a party of frontiersmen were fitted out and after several months of exploration purchased the Arivaca rancho, near Tubac, and established the headquarters of the company at the old mining town of Tubac, on the Santa Cruz and near the Santa Rita Mountains and the northern spurs of the Arizona or Arizuma.

Mr. Ehrenberg was an accomplished engineer, prospector, and miner, greatly interested in the promotion of the interests of Arizona. He was foully murdered while asleep in camp upon the banks of the Colorado by a Mexican who wanted Ehrenberg's saddle. This rancho, in addition to all its mineral wealth, contained large areas of agricultural land with permanent water, wood, and grass, contained twenty-five silver mines or openings which were worked by the Mexicans before the Apache war, and became famous for their rich ore. The best known mines were San Jose, Santa Margarita, Basura, Blanca, Azonias, Tafitos, Amado, and La Purisima. Titles were also acquired to many veins of silver ores in the Santa Rita Mountains, among which were the old mines of Salero and Ojero.

Heintzelman Mine.

Several miles northeast of the Arivaca rancho, on the Cerro Colorado, other interesting and important mining localities were found, among which were the Heintzelman, Mina Carlos, Mina Cesario, Puertocito, Guadalupe, Amarilla, and Mina Longozenia. These results led to the permanent organization of the company known as the Sonora Exploring and Mining Company, of which Major S. P. Heintzelman, of the United States Army, who was several years stationed at Camp Yuma, was elected president. Attention was specially directed to the Heintzelman vein, which in 1857 had been opened to a depth of 50 feet. The Salero was opened to a depth of 80 feet. This mine is said to have been so named from the fact that silver saltcellars were made from silver taken from it for the use of the bishop. The development of the Heintzelman and other properties was actively promoted by Colonel Posten, who obtained capital from the Eastern States, largely from Col. Samuel Colt, of Hartford, Conn. The machinery and supplies were sent out at great cost, especially for transportation across the country from Yuma. Reduction works were erected on the Arivaca rancho, 8 miles from the mine, and at these works the barrel amalgamation process was introduced for the first time in the United States. Pumpelly, in writing of this property, says:

"The results of an examination proved so satisfactory that considerable attention was drawn toward that part of New Mexico. Joint-stock companies with

little ready capital and immense expectations were formed. Speculators bought in stock for 1 per cent of its nominal value and sold out at from 50 to 90 per cent to tradesmen and widows too poor to meet assessments when means for working were absolutely necessary. Between the absence of available funds on the one hand and of protection of life and property on the other, enterprise was already beginning to stagnate when the withdrawal of the United States troops made the abandonment of the country absolutely necessary."

Mr. Pumpelly here refers to the domination of the Apaches after the withdrawal of the troops. Mining and prospecting were suspended and the miners fled. Piles of rich ore about the mines were hastily covered up with waste rocks and the country was abandoned.[1]

Colonel Posten and Mr. Pumpelly were among the last to leave, and arrived in San Francisco in the winter of 1861, where Mr. Pumpelly joined the writer in the voyage to Japan, and established a school of mining and science under the auspices and support of the Government by the Tycoon, and an exploration of a portion of Yesso was made.

PATAGONIA MINE OR MOWRY MINE.

About 1859–1862 the Patagonia mine, afterwards known as the Mowry mine, excited great attention, being extensively worked and made known in the East by its chief owner, Sylvester Mowry. These mines of argentiferous galena were discovered in the Santa Cruz Mountains. Twelve ordinary Mexican blast furnaces were erected, six of them being in blast alternately. The lead bars, weighing about 70 pounds each, were shipped to England, except some of them which were treated for the extraction of the silver with which to meet current expenses. This smelting was accomplished in the Mexican vaso. The silver bullion was cast into bars worth from $2 up to $300 each, and these were used as money. Twenty-five tons of products of the Mowry mines were sent to Europe as specimens in 1862. On the 8th of June, 1862, Mr. Mowry was arrested under the order of General Carleton on a charge of treasonable complicity with the rebels and his mining property was confiscated.

CAHUABI.

The mines of the Cahuabi and Fresnal region, southwest of Tucson, early attracted attention and were worked by Mexicans using the patio process. So, also, the copper mines at the Ajo excited the admiration of the pioneer prospectors who followed, or were connected with, the boundary survey.

AJO.

The old Arizona Copper Company (Ajo) was one of the first, if not the first, mining incorporations upon Arizona property. The marvelously rich copper ore from that property, consisting of heavy masses of native copper, red oxide of copper, and green carbonate mixed together, made it possible to transport it overland from the Ajo to the head of the gulf and to ship it from there to Sa Francisco and Swansea, England, at a profit. Much ore was sent abroad from these mines before 1860. At that time the cabinet mineral collections in San Francisco of Donald Davidson, of General Allen, and of Capt. R. L. Ogden, were adorned by choice specimens of these ores. These mines are now (1899) being reopened, deepened, and worked with promising results. The carbonated and oxidized ores give place to rich sulphides in depth. These require concentration, which is successfully accomplished, though want of sufficient water is a great drawback to the rapidity of development. By the courtesy of Peter R. Brady, sr., now of Florence, Ariz., I am able to add the following statement regarding the early history of this copper property. It was prepared at my request for this report, and being the testimony of an eyewitness and participant in the earlier working of the Ajo it is extremely valuable as an addition to the record of mining in Arizona.

"The Ajo mine was located in November, 1854, by a party of Americans from California. The organization was known as the Arizona Copper Mining and Trading Company. Maj. Robert Allen, U. S. A., deputy quartermaster-general of the Department of the Pacific, was the president of the corporation, and J. Downer Wilson, of San Francisco, was secretary and treasurer.

"At that date the present boundary line between Sonora, Mexico, and the territory of the United States had not been determined, and its position was not ascertained until the following year, 1855.

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[1] Raphael Pumpelly, "Mineralogical sketch of the silver mines of Arizona," Cal. Acad. Nat. Sci., 11, 1862.

"As soon as the region began to be occupied by citizens of the United States and work commenced on the Ajo mines, these mines were claimed by several wealthy residents of Sonora as being within Mexican territory. In the month of March, 1855, a Mexican company of cavalry was sent from the district of Altar and from Ures, the capital of Sonora at that time, to dispossess the Americans, to capture them, and take them to Ures as prisoners. But the miners refused to go and defended their position. With only 9 men against 110 dragoons and vaqueros, the mine was successfully held and the Mexicans were dispersed. For six months after this nothing was done beyond mere prospecting, but in the fall of the year 1855 the boundary line had been run, and it was found that the Ajo mining camp was at least 40 miles inside of the boundary on the United States side. Edward E. Dunbar, one of the pioneer residents of San Francisco, was then made the superintendent of the property and work was resumed in a formal manner. The mining locations, of which there were 17 made in that year, all had some work done on them. In the meantime 10 tons of selected ore had been taken from shaft No. 1. This ore consisted of red oxide of copper. It was shipped to Swansea and was sold for a little less than $400 per ton. There were several hundred tons of sulphurets of copper extracted from the different workings. The principal portions were in a limestone formation, but the richest ores were all found near where the first work was done and were in porphyry.

"The company attempted to transport the ore to San Francisco and thence around Cape Horn to Europe, but the costs were so great that their plan of transportation had to be abandoned. For the first year, on every pound of ore transported from the mine by way of Yuma to San Francisco the freight alone amounted to 9 cents. A reverberatory furnace was built at a cost of over $30,000, and not as much as 100 pounds of copper was ever produced in it. Finally, after several years of great expenditure, the company ceased operations. The property was left in charge of a keeper whose claim for services amounted to $5,000, and the property was sold at sheriff's sale."

MOHAVE COUNTY.

Mohave County attracted the attention of United States prospectors as early as 1858 in a search for placer gold deposits. In the year 1880 the most important mining districts were the Aubray, Cedar Valley, Greenwood, Hualapai, Maynard, and San Francisco. Many claims are enumerated in the report by Mr. Burchard for 1880–81.

The discovery of placers at La Paz in 1863 drew many miners from California to Arizona, who penetrated to Weaver, beyond the Hassayampa, and helped to clean up the wonderful deposits of coarse gold in that camp and on the top of Rich Hill.

VULTURE MINE.

The same year (1863) was marked by the discovery of the great quartz vein, since known as the Vulture, by Henry Wickenburg, which was worked for a decade, but under great disadvantages, owing to the constant presence of the murderous Apaches. For a time the miners were paid off, not in coin, nor in promises, but in chunks of gold chopped off with a hatchet from the ingots and weighed out to them according to the figures on the pay roll. The stamped bars of gold from this mine were current all over central and northern Arizona, and it was the only mine in the Territory for a long time that kept up the reputation of the country and sent out regular shipments of bullion.

CASTLE DOME.

This district was organized in 1863, and for a time ores were shipped by water to San Francisco, or until the completion of the railroad to Yuma. Since then the ores are taken down the river by boat, and are then transferred to the railway. The freight to San Francisco from the landing on the Colorado River was $12 per ton. The galena ores averaged 60 per cent lead, 35 ounces of silver, per ton. The selling price at that time was about $60 per ton.

PLANET MINE.

The Planet Mine, on the Colorado River, in 1871 kept about 20 men at work and had shipped from 100 to 150 tons of copper ore of high grade to San Francisco monthly by way of the river to San Isabel, where the ore was transferred to vessels for San Francisco by way of the gulf.

Mining gradually extended up the Colorado and into the contiguous territory. The Hualapai district became prominent about 1870, 1871, and 1872.

HUALAPAI DISTRICT.

In the Hualapai district little was done in the year 1871 except to make locations and the amount of work essential to hold them. In 1872 a 5-stamp mill was erected and 2 furnaces. The furnaces were reported as total failures, but in December, 1872, a third furnace was completed, and being properly managed was successful. Most of the work even in 1872 was superficial, and few of the pits were over 30 feet deep. The oxidized ores soon gave way to the undecomposed pyritous ores rich in both silver and gold. The district in 1872 could boast of having some 2,700 locations, about 1,000 of them in separate lodes, the rest being the extension of the first locations. Several other districts were set off at that date, among them the Maynard, about 10 miles north, and the Cedar district, about 60 miles south.

SAN XAVIER.

The San Xavier, south of Tucson, had been developed to a considerable extent as early as 1875, and efforts had been made to smelt the ore. It is recorded that a quantity of the ore smelted in a Mexican furnace gave good results.

TOMBSTONE.

The discovery and development of the rich ore deposits of Tombstone mark an era in the history of mining in Arizona. In the latter part of the year 1877, A. E. Schieffelin and his brother left Camp Huachuca to explore the Mule Mountains, which were then dominated by the ruthless savage Apaches. He was advised to take his tombstone with him, and when he discovered the rich ores and named the claims the Tough Nut and the Goodenough, he gave the name Tombstone to the camp. This was in February, 1878. A wonderful development followed. Millions in value were produced. A large and thriving city grew up. The hills were covered with mining hoists and piles of ore and débris. The Tombstone Mill and Mining Company, the Contention, Grand Central, and the Girard were leading producers. At length the level of permanent water was reached, the ores changed in character, and the water was found too great in volume to be controlled by one property. United effort has not been secured, and these properties are idle, and Tombstone is practically to-day a deserted city. Schieffelin has passed away, but his tombstone, in the form of an imposing, massive masonry pyramid of granite bowlders, towers over the scene of his discovery, a fitting monument to his courage and enterprise.

SILVER KING.

The Silver King, for years one of the most brilliant of the silver producers of Arizona, and which built up the prosperous towns of Pinal and Silver King, was discovered in March, 1875. It was worked for several years under the chief ownership of Col. James M. Barney, and paid some millions in dividends, but since the fall in value of silver, and for other reasons, it is now idle.

COMMONWEALTH.

The discovery of the value of the Pearce or Commonwealth mine in 1895 has resulted in the building up of a thriving community in the Sulphur Spring Valley near to the eastern base of the Dragoon Mountains. It is to-day one of the largest producers of gold and silver in the Territory.

COPPER MINES.

The great copper-producing camps of Arizona are comparatively of recent growth. The first location at Globe dates from 1875. It was long handicapped by the difficulty of access and of transportation, but is now (1899) connected by rail with the Southern Pacific.

The Rosemont copper mines, which were worked for a time by the late L. J. Rose, passed, in 1896, into the hands of the Lewisohn Brothers, of New York, and are being developed.

In the Sierritas, 18 miles south of Tucson, the year 1899 witnesses the erection of a copper smelting furnace at the azurite claims and the production of ingots of copper and copper matte.

The old San Xavier lead, zinc, copper. and silver mine, which has been idle for years, is now (1899) being worked and is producing.

COPPER QUEEN.

The Copper Queen mine at Bisbee was discovered by Hugh Jones in 1877. The honor of this discovery is also claimed for George Warren in 1878, who sold out his share in 1880.

For several years this mine was barely worked sufficiently to satisfy the requirements of the law. It was once sold with difficulty for $1,250,000, and appeared at one time to be nearly worked out. It is now well known as one of the leading copper mines of the United States, and is connected by rail with the Southern Pacific at Benson. The value of the ore extracted up to September 1, 1883, was reported as $3,000,000. The value of the annual production is now (1899) believed to be not less than 25,000,000 pounds.

GRAHAM COUNTY.

The extensive copper deposits in Graham County, in the valley of the San Francisco River, at Morenci, Longfellow, Clifton, and vicinity, were discovered about 1865, and were brought prominently to notice in 1871. These mines were among the earliest producers. Furnaces were erected and the copper bars were shipped out by ox teams overland.

UNITED VERDE.

The far-famed United Verde copper mine, although originally located back in the sixties, had a struggle for existence, as a paying property, until 1887, when capital and intelligence came to its rescue, and placed it among the foremost copper producers of the world. The property was purchased by Hon. W. A. Clark in 1888. Copper production began in March and continued during the summer at the rate of about 600,000 pounds per month, this being the quantity required by contract with the syndicate. (Vide Min. Res. U. S., 1888, p. 59.)

OLD DOMINION.

This mine at Globe was run with one furnace in 1888. Coke at that time cost $48 per ton.

WOLFRAMITE.

The discovery of wolframite in 1898, in workable quantities, at Russellville in the Dragoons and at Gijas, Arivaca, and other places, added an important mineral to the list of Arizona's productions, and has introduced a new mining industry.

SCHOOL OF MINES.

The citizens of Arizona have not been unmindful of the importance of general education and especially of education in the art of mining, and in the sciences and arts, upon a knowledge of which the success in mining and metallurgy so greatly depends. In 1885 the Territorial legislative assembly passed an act establishing a university to include a School of Mines. This marks a new epoch in the history of mining in Arizona, and it was a fitting recognition of the importance of the mining industry to Arizona. A contract for the chief building for the School of Mines, located at Tucson, was let in October, 1887, but the building was not completed and opened until October, 1891. Since then, in the absence of any available funds for the university building, the School of Mines building has been used by all departments of the university. The instructionin the university is provided for by the General Government out of the income from the Morrill fund. Theoretical and practical instruction is given in mining, geology, mineralogy, assaying, and general metallurgy. Several of the students and graduates have entered actively into the work of mining and metallurgy, and occupy important and remunerative positions as assayers and metallurgists in different parts of the Territory.

TERRITORIAL MUSEUM.

In connection with the university and the mining school a museum has been established, in which specimens of the minerals, ores, and the building materials of Arizona and other regions are displayed and used for the educational work. There is also a superb collection showing all the birds of Arizona.

STATISTICS OF MINING AND PRODUCTION OF THE PRECIOUS METALS.

No provision has been made for the official collection of statistics of the mining industry in Arizona. The county commissioners of immigration have annually endeavored to supply the details for their respective counties. The former commissioners of mining statistics for the whole United States, especially for the States and Territories west of the Mississippi, also endeavored to secure the figures representing the annual production of the mines, and much valuable information is recorded in their reports. The Territorial geologist has also endeavored to secure full and reliable information upon the progress of mining, but a general indifference, particularly on the part of the larger and most successful mine owners and managers, render the task a difficult and thankless one. The slow but sure method of personal observation seems to be the best solution of the difficulty.

OUTLOOK FOR 1899.

Never before in the history of Arizona has there been such a general activity in prospecting and mining at all the chief districts and mines of the Territory.

DISTRIBUTION OF METALLIC WEALTH IN ARIZONA.

Arizona is essentially a mineral-producing Territory. There is no other part of North America of equal area where probably such a variety of minerals can be found. Many of these minerals are extremely rare and occur elsewhere but sparingly and as curiosities for the cabinet of the mineralogist rather than in commercial quantities, as in several instances in Arizona. But there is not only a great quantity of minerals, but the geological structure is varied and comprehensive. Representative outcrops, ridges, and mountains are found of nearly all of the chief formations and systems known to the science of geology. And so far there has been but comparatively little systematic study of these formations. The field is new, the harvest is ready, but the reapers are few. This results partly from the immensity of the distances, the great scale upon which the Territory is built, the absence till recent years of railway transportation, the presence of bloodthirsty savages, now happily restrained, and the failure, with but few exceptions, of any appropriation of money by the General Government or by the Territorial legislature to defray the expenses of exploration and publication. The unparalleled magnificence of such grand features of the earth as the canyon of the Colorado and the chain of extinct volcanoes towering above it have, we may say, compelled attention, as the monographs of Powell and of Dutton may testify. The rapid reconnoissances of Sitgreaves, of Whipple and Marcou, of Parke, Emory, Bartlett, Gray, and others, are not forgotten, but the fact remains that we yet know but little in detail of the structure of the mountain ranges of Arizona and of the treasures they contain.

An attempt to show the geographical distribution of the mineral wealth of the Territory of Arizona results in the generalized statement that all of the mountain ranges are mineral bearing. Even the plateau region of the northeastern portion has its deposits of value, of building stone and of coal and probably of other mineral substances of commercial value. This statement, penned in the report for 1896, has been notably verified in the discovery of deposits of copper ore and of veins of gold and silver and tungsten. But the chief region of occurrence of the precious metals, of copper, of lead, and of other metals and minerals, lies southwestward from the Grand Canyon region and of the great lava districts around the extinct volcanoes of the San Francisco Mountains, which we may assume cover from view important deposits of mineral wealth. The uplifted strongly scarped and eroded mountain ranges of the central and northern portions of the Territory are more accessible to the prospectors and reveal their treasures more completely.

The chief region of metalliferous minerals and mines thus commences on the northwest, in Mohave County, at the sharp bend of the Colorado River at Cornville, and it extends southeastward diagonally across the Territory for nearly 500 miles in a broad belt of high and ragged mountains, including the Bradshaw

Mountains, the Mazatzals, the White Mountains, the Apache and Pinal Mountains, the Santa Catalina Mountains, the Santa Ritas, Huachucas, the Chiricahuas, the Dragoons, the Mule Mountains (Tombstone), and other ranges. All these mountains, with their spurs and subordinate parts, are known as mineral bearing. They all invite and reward faithful prospecting. In support of this statement we need to refer only to the discovery in the granite rock of the Dragoons in 1898 of valuable deposits of tungsten, elsewhere noticed in detail, and to the late discovery, also, of a promising vein of the precious metals upon the western slope of the Baboquivari Range.

The chief towns, cities, mining camps, and mining districts are distributed along the course of these mountain ranges of central and southern Arizona in one broad belt, extending diagonally across Arizona from Nevada to Mexico. Commencing on the northwest end at the Colorado we have in succession southeasterly Mineral Park, Hillside, Congress, Jerome, Prescott, Phœnix, Florence, Pinal, Globe, Mammoth, Tucson, Tombstone, Bisbee, Pearce, Arivaca, and Oro Blanco. The Longfellow copper mines and others of Clifton lie upon the northeastern border of the belt, while upon the southwestern border we find the celebrated district of Harquahala, Weaver, Vulture, and many other districts. Passing farther westward we come upon the lower or piedmont region of broad and extensive valleys and plains, broken by numerous isolated ridges and ranges, all trending northwest and southeast, parallel with each other and with the main central axis of mountains.

These mountain ranges and valleys fill out the area of the Territory to the Colorado on the west and Mexico on the south. They are all mineral bearing.

The ancient district of Castle Dome, celebrated for its beautifully formed veins of argentiferous lead ores, lies about 20 miles north of Yuma, in the extreme southwest corner of Arizona. Silver district, with very large veins carrying silver ore, adjoins Castle Dome northerly, and there is a continuous series of mining camps and locations of gold, silver, and copper ores northward along the Colorado River to La Paz, Ehrenberg, Bill Williams Fork, Mohave, and beyond.

And directly across the Colorado River in California, but tributary chiefly to the development of Arizona, there are the gold-bearing districts of Picacho, the Black Range, and the Mohave Desert region, reached by the Atlantic and Pacific Railway.

COMMUNICATION—TRANSPORTATION.

The great trunk lines of railway, portions of two transcontinental systems, traverse Arizona from east to west and give convenient access to the mining regions on the north and on the south. The Southern Pacific, entering the Territory from New Mexico near San Simon, crosses the counties of Cochise, Pima, Pinal, Maricopa, and Yuma. The Atlantic and Pacific road, entering from New Mexico on the head waters of the Puerco, a tributary of the Little Colorado, crosses the counties of Apache, Coconino, Yavapai, and Mohave. It crosses the Colorado River to California at the Needles. These two transcontinental lines are connected from north to south by the Santa Fe, Prescott and Phœnix Railway and the Maricopa and Phœnix and Salt River Valley Railway. A branch road from Benson southward extends to the Gulf of California at Guaymas, and another road, the Arizona and Southeastern Railroad, extends from Benson to Bisbee. A branch from the Southern Pacific, at Teviston or Bowie station northward to Solomonville and beyond to San Carlos and Globe, and known as the Gila Valley, Globe and Northern Railway, has been completed and gives access by rail to the extensive copper-bearing district of Globe. The copper fields of Morenci and of Clifton are reached by the Arizona and New Mexico Railway, which connects with the main line of the Southern Pacific at Lordsburg, N. Mex. Those only who have lived and labored in Arizona before the construction of these roads can appreciate their inestimable value to the Territory and to civilization. They have rendered possible the proper development of the mineral and agricultural resources of Arizona.

CLIMATIC ADVANTAGES OF ARIZONA, WITH REFERENCE ESPECIALLY TO MINING.

The Territory of Arizona enjoys peculiar advantages in respect of climate for working mines and ores. Mining in the open air, without the protection of buildings, can be conducted every day in the year without hindrance from snow or extreme frosts. Even in the midst of the Bradshaw Mountains or central mountain ranges snow rarely falls to so great a depth as to seriously interfere

with mining work or to impede or suspend transportation. The air at all seasons is comparatively dry and bracing, and in midsummer a slight shade of brush or canvas suffices to keep off the excessive heat of the sun. Death by sunstroke is unknown. In midwinter the days are bright and clear and are higly favorable to protracted labor. In the region of Tucson, at an altitude of nearly 2,500 feet above the sea, while the nights in winter are frosty and bracing, severe and long-continued freezing weather is unknown. Water in open shallow pools freezes at night, but when covered or in pipes a slight protection by soil or wrappings is sufficient to prevent freezing. The great heat of the sun by day warms up the soil to such a degree that frost does not penetrate deeply or freeze the ground if dry. The luxuriant growth of many of the cactacea and other plants among the cliffs and rocks of Arizona, which could not for a night withstand the frost of a Northern or Eastern winter, may be explained by the fact that the rocks absorb large amounts of heat from the sun by day and radiate this heat slowly at night. Some of the very dark-colored rocks, or those with a black surface, exposed to the sun on the deserts become so hot as to be uncomfortable to the hand. Cliffs of black lava thus become repositories of heat and exert an important influence upon the growth and distribution of plants.

The economic industrial advantages of being able to work the mine and mills or leaching works without hindrance or interruption by the weather may be best appreciated by those who have had to combat the furious freezing storms of Colorado, Montana, Idaho, or the Klondike. Expensive plants in Arizona for leaching out gold with cyanide solutions or by chlorine water do not require the costly protection of buildings or artificial heat. The work may be carried on continuously every day in the year without being frozen up.

Record of temperatures at University of Arizona, near Tucson.

Month.	Mean.			Highest.	Lowest.	Absolute range.	Greatest daily range.	Least daily range.
	Maximum.	Minimum.	Monthly.					
1898.								
January	60	32	46	73	17	56	47	18
February	75	40	58	83	32	51	44	19
March	71	40	56	82	25	57	45	14
April	83	51	67	95	34	61	51	13
May[1]	84	54	69	95	45	50	40	25
June[2]	98	68	83	106	58	48	43	19
July[2]	99	74	86	108	66	42	36	13
August	97	73	85	106	66	40	34	13
September	95	63	79	102	55	47	43	11
October	89	48	68	98	38	60	51	29
November	72	36	54	90	21	69	49	11
December	59	35	47	74	22	52	37	5

[1] First twelve days only recorded. [2] Last twenty-three days only recorded.

GOLD, GOLD VEINS, MINES, AND PLACERS.

GOLD—ITS DISTRIBUTION IN ARIZONA.

Of all the metals, gold is the most widely and generally distributed in all parts of Arizona. It occurs either as placer deposits or in veins in nearly every mountain range from Yuma on the west to the Chiricahuas on the east, or over the whole breadth of the Territory. Locally, it is more generally spread along the course of the mountains and in the streams descending from them. Many of the placer deposits are but partly worked, owing to the scarcity of water.

CONGRESS MINE.

The Congress group of mines is located in Martinez mining district, Yavapai County, Ariz., near the line of the Santa Fe, Prescott and Phœnix Railway, about 70 miles north of Phœnix and 66 miles south of Prescott. The town of Congress and the mines and reduction works are located at the mouth of a short canyon, broad enough at the bottom to give ample room for the necessary buildings for town and works. The outcrops of the veins are on the mountain sides, giving abundant fall for waste dumps and the proper arrangements of mills. The water supply comes from Martinez Creek, 1 mile away. It is raised 500 feet by a steam pump to get over the ridge, and runs into the camp by gravity. Three hundred and fifty men are employed in the mines and surface works. The mills, mine, and all company buildings are lighted by electricity. The company owns and oper-

ates its own railroad from the junction to the camp. By a system of switchbacks the cars are taken up the mountain side so as to deliver coal, timber, and other mine freight directly at the mines. The company operates a general merchandise store and boarding house, and provides sleeping rooms lighted by electricity for its men. A hospital is also maintained, where the injured and sick are cared for. The wires of the Postal Telegraph and Cable Company run into the camp, and the Congress company maintains a regular office.

Claims.—Twenty-three claims are owned, and the greater part of the work has been done on only three, the Congress, the Niagara, and Why Not, although the others all carry promising veins, and will be explored in the future.

Geology.—The country immediately around Congress is all granite and granitic gneiss. This rock is cut through by a series of approximately parallel dikes of greenstone trap, having a general easterly and westerly strike and a dip of about 20 degrees to the north. The Congress vein is in one of these veins; or perhaps it may be said that the dike is the vein, for ore has been found in the dike in all possible positions from one granite wall to the other, but generally occupying a position near the foot wall and separated from it by a layer of vein selvage. The dike has a thickness of about 15 feet, measured at right angles to the walls; but this is uncertain, as we rarely see the hanging wall in the mine, the drifts hugging the foot wall, and their height not being sufficient to expose the hanging. These greenstone dikes are crossed by other more nearly vertical dikes, having a northeasterly and southwesterly trend. The cross dikes are apparently a kind of quartz porphyry. Very little is known of them, as they do not appear to be ore bearing, and have been but little exposed in the underground works. They do not seem to mark lines of faulting, as the greenstone dikes are not thrown at the intersection. They are apparently of more recent origin than the greenstone dikes, as they seem to cut the latter and occupy the space of intersection.

The following analysis of a specimen of greenstone was made at the Sheffield Scientific School, Yale University. No analysis of the quartz porphyry has yet been made:

	Per cent.		Per cent.
SiO_2	52.20	MnO	1.90
Al_2O_3	13.40	CaO	9.60
FeO	9.75	MgO	1.16

Besides the Congress vein, described above and upon which the greater part of the work has been done, there are several others of equal promise on the surface and holding out extremely well to the extent of the development work that has been done upon them. One of these crosses the Congress at an acute angle, and another, known as the Niagara vein, is parallel to and in the foot wall of the Congress. These veins are entirely inclosed in the granite without the accompanying dike, which is such a marked feature of the Congress vein. The Niagara vein is now being systematically opened by shafts over 3,000 feet apart, both of which show up a large continuous vein of excellent grade ore down to the present level of 300 feet with every promise of continuance to great depth. There are numerous smaller veins carrying good ore and running approximately parallel to the Congress and Niagara, but none of them has been explored to any extent.

Ore.—The Congress ore is white quartz, carrying very pure iron pyrite, generally disseminated through it in small particles, but at times in quite massive form. There is little, if any, gold in the quartz showing no pyrite and hardly any free gold exists in the ore.

The pyrite carries, on an average, about 8 ounces of gold per ton. Other sulphides so commonly accompanying iron pyrites are notably absent, a little galena of very rare occurrence being the only one identified, and chemical analysis of the concentrates from the ore showing hardly a trace of copper, arsenic, antimony, or, indeed, of anything but iron, sulphur, and silica.

The Niagara ore, on the other hand, shows considerable galena and some copper minerals besides the iron pyrite. This difference seems to be rather characteristic of the ore of this neighborhood, when the veins are entirely in the granite, as distinguished from those which are accompanied by the greenstone dikes.

As stated above, the ore in the Congress vein is generally near the foot wall. Its position and appearance suggest that it occupies what have been the exceedingly flat lenticular cavities produced by a fracture of the dike along the plane of its dip, followed by sufficient movement along the line of fracture to leave such cavities by reason of the inequalities of fracture. There is no evidence of the replacement of the greenstone by quartz, the whole appearance being that of the filling of preexisting cavities by deposition from mineral waters. The valuable contents of the vein have been quite likely derived from the greenstone by segregation and infiltration.

Underground works.—There are three principal shafts on the Congress, all sunk on the vein and conformably to its dip. No. 1 and No. 2 shafts are 600 feet apart and the No. 2 and No. 3 1,000 feet apart. Nos. 2 and 3 are connected on the 1,700-foot level and each have hoisting machinery capable of sinking to 3,000 feet. Sinking is still in progress with air drills, and a depth of 2,400 feet has been attained, proving the dike and ore to be continuous and strong to that depth, the ore in fact being larger and of better than average grade. The system of mining aimed at is to block out the ground by main levels, driven dead, approximately 300 feet apart. Stopes are then started at the shaft and rise above these levels. As the tops of the stopes reach the height decided upon as the proper distance for another level (generally 75 feet), the level is carried in, practically being already formed by the stope, with the exception of a little cutting of the roof to make room for the timbers. The ground stoped out is filled with waste as soon as possible, as the roof soon becomes heavy and the temporary supports put in during stoping would crush without filling. By this method of stoping a large part of the waste broken is kept underground, serving the purpose of supporting the roof, saving hoisting, and causing the air to circulate upward along the working breast of the stopes.

Reduction works.—The reduction works consist of a 40-stamp mill and a cyanide plant for treating the tailings. The milling process is as follows: The ore from the mine is dumped on grizzlies, the oversize passing through two 9 by 15 inch Blake crushers, and thence with the fines to storage bins of about 1,000 tons capacity. Tullock feeders draw their supply from these bins for the 40 stamps. The stamps weigh 850 pounds each, and drop 6 inches 90 times per minute. Steel wire screens are used of 20 holes to the linear inch, No. 24 wire. The pump is fed direct to 20 Frue vanners, equally divided between them. The resulting concentrates are dumped upon a sand filter to drain, and while still moist are loaded in bulk, without sacking, into cars for shipment to the smelter, at present the El Paso Smelting Works. The tailings pass to a Frenier & Le Blanc sand pump, which elevates them to settling tanks, and where the surplus water is removed and pumped back to be used over again, while the tailings are run in cars to the dump.

Fine crushing and concentration at one operation on such material as the Congress ore is not a clean operation, but is probably the best process available, considering the very small supply of water. The concentrating percentage is in the neighborhood of 80 on $16 original ore, and the greater part of the loss is in the very fine slimes. It is quite probable that closer work could be done by hydraulic classifying previous to concentration, but the changes in the mill necessary to introduce this in a proper way would be quite extensive, as the necessary fall between the batteries and vanners is at present lacking. The rate of crushing is 100 tons per day or 2½ tons per stamp.

Cyanide works.—The tailings from the concentrating mills are reworked by the cyanide process at the rate of 110 tons per day. The plant comprises a large Brown mechanical roaster; seven leaching tanks, each 26 feet in diameter by 4½ feet deep; four solution tanks 15 feet in diameter by 10 feet deep, together with the necessary bins, boilers, engines, pumps, piping, zinc, boxes, etc., the whole being inclosed in substantial corrugated iron buildings covering an area of over 12,000 square feet. The tailings as they come from the concentrating mill are bedded and partially dried by plowing and exposure to the sun. They are then dumped into a Stedman pulverizer, going thence by elevator to a storage bin, from which they run by gravity to the self-feeder of the roasting furnace. The furnace is fired with California crude oil, using three No. 3 Claybourne burners. Emerging from the roasting furnace thoroughly desulphurized and oxidized, the tailings are automatically carried along on a sheet-iron cooling hearth, passing under a spray of water to lay the dust and assist in cooling, and thence go to the leaching tanks, where the gold is dissolved and collected on zinc shavings in the usual way.

Production.—The gross production of the mines to date is in the neighborhood of $5,000,000, and notwithstanding the fact that the reduction works have been continuously operated at full capacity, the development of the mines has been kept so far in advance of stoping that there is now more ore in sight than at any time since the company began operations.

KING OF ARIZONA.

This gold-bearing property, known for a time as the Gleason, has been transferred to the King of Arizona Mining and Milling Company, a corporation organized under the laws of the Territory of Arizona, with a capitalization of 5,000,000 shares of a par value of $1 each. This company owns four full claims—the Homestake, the King of Arizona, the Last Hope, and the Mucho Bueno. The bound-

aries of the district have not yet been defined nor has a name been given to it, but when it is organized it will probably be named the King of Arizona district. This district lies about 85 miles due east of Castle Dome Landing, on the Colorado River. It is north of the Gila River and about 48 miles from the Texas Hill Station, on the Southern Pacific Railroad. This is the nearest station on the railway. There are several other locations besides those conveyed to the King of Arizona.

The Homestake location covers the chief workings up to this date. There is on this claim a strong vein of gold-bearing quartz. This lode or vein has three well-marked divisions or layers. On the hanging wall there is a soft layer from 1 to 3½ inches wide, which averages about $2,800 per ton in value. Next below this there is a middle layer or body of quartz about 20 inches thick, which will average about $90 to $100 per ton in value. The remainder of the vein, so far as it is exposed by the shaft, averages about $24 per ton. Test holes have been drilled 8 feet deep into the foot wall, and all are in ore. The shaft by which the exposure of the nature of the vein has been made is 200 feet deep and follows the dip of the hanging wall a distance of 40 feet easterly and 30 feet westerly. These show a continuity of vein, having the same characters and values developed by the shaft. The hill rises rapidly both east and west of the shaft, so that the height of backs on the lode above the drifts is greater than at the shaft. At a point about 30 feet west of the shaft and on a level with the collar of the shaft the vein has been crosscut from wall to wall, showing it 18 feet wide at that point. The ore in the crosscut is of about the same grade as that in the shaft. The croppings of the vein may be followed for some 700 feet of the Homestake shaft to a second opening, known as "The King of Arizona Shaft." This shaft is about 50 feet deep, and by means of drill holes the vein is shown to be 11 feet in width and has an average value of $10 per ton. At a point 300 feet east of the Homestake shaft a tunnel has been made which crosscuts the vein 160 feet below the surface. At this point the hanging wall vein is 18 inches wide and has an average value of $50 per ton. The tunnel then passes through 30 feet of vein matter running about $3 per ton, thence through 7 feet of ore carrying $28 per ton to the foot wall. The total distance from hanging wall to foot wall along this tunnel is 40 feet. A drift has been run along the foot wall to the Homestake shaft at a distance of 300 feet, and the average value of the ore exposed is $14 per ton.

At the commencement of operations, and in order to fully test the ores, 2,500 tons of quartz was taken to a 5-stamp mill, which the company owns, on Gila River, a distance of 35 miles south of the mine and 12 miles from Texas Hill. This ore yielded by plate amalgamation about $75,000. The tailings were then treated by cyanide and $30,000 more extracted, leaving in the tailings an average of about $1.50 per ton. After repeated tests it was found that this ore could be treated en masse, after crushing, without running it over the plates or using amalgamation methods. Accordingly it was decided to erect a cyaniding plant at the mine.

In February last the company let a contract for the erection of a reduction plant, capable of treating 100 tons of ore each twenty-four hours, and for sinking wells from which a sufficient water supply could be obtained. This work has been successfully prosecuted. Water was found in abundance 1,000 feet below the surface of the ground at a point about 4 miles from the mines; also at another point 1,000 feet below the surface 15 miles distant from the mines. Pipe lines have been laid, pumps erected, and the reduction plant completed, and is now (August 25) being tested and will in all probability be turned over to the company by the contractors about September 1.

THE CROWNED KING MINE.

The Crowned King is undoubtedly one of the most valuable gold mines in Arizona. It has been producing steadily for more than ten years. It is opened by several tons on the vein, one beneath the other, connected by winzes and shafts. The ore body is regular and continuous and of remarkably even value, although occasionally very rich "strikes" are made. Within the current year considerable ore was encountered that assayed as high as $50,000 per ton. Few mines are so well situated for economical working. The ores are reduced by a stamp mill and concentrators. A large percentage of the values is saved on the plates, the concentrates being shipped away to smelters; this much is known. The product of the mine and the average value of the ore can not be obtained for publication, as the owners consistently refuse to furnish information on these points. Several millions have been produced. It is safe to say, however, that the Crowned King is a magnificent property. It is situated in the Bradshaw Mountains, Yavapai County, about 35 miles from Prescott.

MAMMOTH COLLINS, LIMITED.

This mine in Pinal County, a few miles north of Oracle, is an important gold property. At the date of the report for 1897 it was lying idle, owing to a change of ownership and management, but it was reorganized in 1898, and work was actively resumed. In addition to the Mammoth Mine the company purchased the Collins Group, which adjoined the Mammoth on the west. There ore deposits occur in granite, and are marked by a strong mineralization of the rock traceable through the claims by excessive discoloration. The soil is very red over the whole area. The deposits are large, and very long stulls are required to span the spaces left by stoping. The mill is located on the San Pedro River, some 6 or 7 miles from the mine. Formerly the ore was hauled from the mine to the mill in large wagons, and water was taken back by the returning teams. Under the present management all this is changed. An automatic wire rope tramway has been put up between the mine and mill, and now the ore is regularly transported and delivered into the bins of the mill at a very small cost. In fact the weight of the ore in the descending buckets furnishes all the power necessary, and is also sufficient to take back in a part of the bucket a full water supply for the mine. This tramway effects a great saving of expense per ton and insures a regular and full supply of ore at the mill of 100 tons or more a day.

The tailings which accumulate in large quantities on the mill are now treated with success and profit. This plant has a capacity of 200 tons a day. The extraction is carried to a high percentage of the gold contents. The tailings are dug out of the tanks and are scraped away by mules. Zinc shavings in iron boxes of the usual form are used to precipitate the gold from the solution.

A large wood supply is necessary for the boilers of the mill. Wood costs over $8 per cord delivered there, and the oak groves of the Catalinas at and around Oracle are being decimated by the wood contractors. This meets with regret and opposition, and the Government has made decided objections to this wholesale destruction of the timber.

A plan has been devised to utilize the water of the Arivaipa Canyon by putting in a dam, storing the water, taking it out in pipes under sufficient pressure to run dynamos, and to transmit the electrical energy to the mill in sufficient amount to run it and to do all the hoisting and lighting at both the mine and the mill. This scheme seems to be entirely feasible and if perfected will make a model plant worthy of the beginning of the twentieth century mining.

In association with the gold of this lode there are at places considerable bunches of galenite, lead ore, massive in character and sufficient to make shipments to smelting works. The partial decomposition of this sulphide ore gave fine specimens of massive lead sulphate—anglesite—in crusts and concretionary layers accompanied by olivenite and by cerussite and wulfenite—the molybdate of lead. Of this molybdate, in large masses and crystalline bunches, twelve tons of 90 per cent purity were shipped away in 1898. This was obtained by overhauling the waste dumps at the mine, and the demand and the supply also are now exhausted.

LA FORTUNA MINE.

In the early days of gold discovery in California, 1848, when the news reached the gold miners of Sonora, there was a general exodus of the able-bodied men who were able to get away northwest to the new El Dorado in California, and the State of Sonora contributed many men to the mining population. They took the old road, which was known as the "Camina Real," from Estancia and Altar northwestward nearly parallel to the Gulf, following the mountain ridge known as the Gila Range, just north of our present boundary. The road led to Yuma, and in passing by the Gila Range they went within a few feet or yards of a very modest outcrop of quartz which no one seemed to consider of sufficient value to merit any attention. That humble and insignificant quartz outcrop is to-day the outcrop of the great Fortuna mine.

It is situated on the westward slope and nearly at the base of the range of mountains called on some of the old maps the Gila Range. This trends northwestwardly and reaches nearly to the Gila River at the point now known as Blaisdell. The railway in its course to Yuma passes around the northwest point of this range. Where the rocks are exposed at that point they are mostly of homogeneous granite, of gray color and weathered out at the surfaces, which, however, are much pitted as if by decomposition of some soft substance. But beyond these low-lying hills of granite there are big outcrops of rock which to the experienced eye indicate stratified formations. They are indeed stratified, for the bulk of the range south-

ward and southeastward is composed of regular stratified, laminated, hard gneissic rock I use the word "gneissic" in a very general and comprehensive sense, for you can describe these rocks with much more accuracy if you localize them as mica slates and hornblendic slates, with interpolations of quartzite beds, especially in the upper part of the series, with green stains, supposed to be stains of copper and decomposition of copper ore, which they probably are, although there are some peculiarities of color, and some yellow colors, which indicate to me the presence of some other mineral, possibly tellurium, which by its decomposition has given these colors. The fact remains, however, that the bullion from the upper part of the vein contains more copper than it now contains in the lower levels of the mine. The workings which have been carried on here have developed a condition of things which could not be foretold from an inspection of the outcrop. The vein or lode appears to be a chimney, not a continuous ore body nor a continuous vein with an ore body or chimney or chute upon it. As remarked the outcropping points indicate that there is no very great longitudinal extension of this ore.

The vein is remarkable, first, in this limited outcrop; second, in its continuity in depth, its continued and satisfactory richness, and the promise it gives of enrichment by further veins dipping into it on the foot-wall sides.

Some facts in regard to the product or yield: The ore paid from the surface. The product or ore extracted up to the time has been about 80 tons per day, which is sent to the 20-stamp mill, each stamp of which crushes about 4 tons in twenty-four hours. The extraction is chiefly and largely by power drills. A force of 80 men is employed by this mine and mill. The greater part of the labor underground and mining is done by compressed air. The lode, I was told, was 6 to 15 feet wide. This large space permits the use of power drills to great advantage. In the material hoisted there are fragments of the wall rocks, some of which are thrown out, but many pieces pass through the mill. They would prefer to reject most of this wall rock, but it would take more time and expense than it does to mill it, and there is a chance of some of it containing gold. From these 80 tons of rock crushed daily the average product is perhaps $48,000 worth of gold per month. Some months they have produced as high as $90,000.

In the region of the Fortuna Mine the formations appear to be wholly of mica slate and hornblende slate, with some arenaceous layers like old micaceous sandstone and quartzites. The mine is surrounded by black hornblendic slates and mica slates, dipping southward and southwestward at an angle of about 45 degrees, and these slates are very evenly laminated, ridge after ridge. There is apparently a continuous body stretching to a distance of 2 or 3 miles, and showing a thickness at right angles to the stratification of no less than 6,000 or 8,000 or perhaps 10,000 feet, and there is no evidence whatever of plication. The stratification is flat and as regular as the leaves of a book. Usually we detect more or less plication or folding in such a section, but there is no evidence of any folding whatever in this series. There is, however, a great difference in the composition of the layers of these rocky ridges, now all turned black upon the surface—a condition of coloring which seems to attend all the rock outcrops along the lower Colorado, and the origin of which, though discussed by Humboldt after noting similar blackening of the rocks along the Orinoco, has not yet been satisfactorily explained. This general blackening of the surface hides the changes of composition, which may be noted by careful and close inspection.

In some places hornblendic slates are more developed than the mica slate, and at others the micaceous schistose characters predominate and are accompanied by layers of quartzite interleaved and 3 or 4 feet in thickness, sometimes 3 or 4 inches, and some foliated quartz having little films of mica in it. These quartz beds are members of the series, but have been located as ledges, and, it is claimed, are gold bearing. The quartz has little or no resemblance to vein quartz, and yet at several points in the outcrop there are stains of green color, apparently from the decomposition of ore like that which has given green stains to the croppings of the Fortuna

Several dike-like seams or veins of white albite or soda feldspar cut directly across the bedding of the mica-slate series. These feldspathic dikes do not appear to have any relation to the ore-bearing vein or lode of the Fortuna. These dikes are extremely irregular and appear to have filled cross fractures or breaks of the regular strata.

Coarse granite was noted at the northern point of the Gila range, along the railroad, but no evidences were found of the existence of stratified Paleozoic or secondary rocks. The mica-slates series referred to is the Huronian or Archæan.

VULTURE MINE.

This well-known gold mine is one of the oldest in the Territory. Its fame in early days was based upon its great production of the yellow metal and the difficulties under which the gold was obtained. Some or the greatest of these obstacles were the absence of water and the presence of the savage Apaches and the distance from civilization and supplies. Sold originally by Weaver for an old pipe, it repaid the purchasers by millions of dollars' worth of precious metal. Without banks upon which to issue checks to pay the men and without means of transporting coin to meet the pay rolls, the ingots of gold were chopped up with hatchets and chisels and distributed to the men in liquidation of their wages. Yet the property has seen dark days, and has at intervals stood idle, while not one of the shafts had been sunk much more than 800 feet. A victim of extravagant valuations and promises based upon its past record and of stock jobbing exploitations, the proper working and development of the property have been neglected.

The vein at the surface was divided up into parallel layers, which were more or less broken over and dislocated. These trifling displacements were sufficient to frighten some of the weak-kneed grass-root miners, and gave rise to the fallacious saying in California that the "veins in Arizona had no roots." But these little breaks have been passed and only serve to show the great breadth of the lode and to indicate the best position for more extensive and deeper work. Instead of some 400 feet in depth, as now, a shaft should be put down 1,200 feet or more, with proper drifts and connections with another shaft farther west. The property changed hands early in the year 1898, and it is hoped will now be worked upon its merits. It is understood that the cyanide plant erected upon the banks of tailings yielded a profit of $75,000. This mine produced in its early history upwards of four millions of dollars, and it is believed that under modern methods of development and working it will be a great producer for many years.

SEXTON LODE.

This quartz lode, also known as the Leviathan and as Staunton's, is in the Weaver district, Yavapai County, about 25 miles from the Vulture, and is now well known for its great extent and prominence, though explorations upon at least a a part of it have failed to show sufficient value to justify working. It remains to-day in nearly the same condition, save the prospect holes and cuts, in which it was left by Sexton. The discovery of this ledge appears to have been made in 1870 or 1871. It was announced in Raymond's report for 1872. The location was probably made by Mr. Sexton while he was engaged at the Vulture. The dominance of the Apaches in that section will account for the slowness with which the region was prospected. When Sexton left the Vulture he put Staunton—Lord Staunton—in charge. Staunton did the assessment work for some years, and, as presumably remittances to cover the costs were not regularly made, he relocated the ground in his own name. It is what is called a blanket ledge. The size of the lode and the quantity of quartz exposed are enormous. The quartz lies upon the northern slope of the hill and practically forms the surface of the hill. It extends to the crest of the hill and there outcrops in a continuous ledge, broken down into a confused mass of great blocks of white quartz. Considerable development has been had on this mine within the past few years. The ledge has straightened up, and such values have been found as is believed will make it profitable to work the property.

LONE PINE GROUP, YAVAPAI COUNTY.

This group of gold-bearing claims is situated about 9 miles south of Prescott, in the Hassayampa mining district. There are eleven claims, named Robert Emmett, Parnell, White Hawk, Black Hawk, Lone Pine, Greyhound, Polar Star, Reindeer, Blue Bird, Red Bird, and Black Oak. In connection with these a mill site was located on the Hassayampa River. The veins on these claims are described as formed chiefly of quartz carrying free gold above the water line and auriferous sulphides below. The most prominent outcrop is upon the Blue Bird and the Red Bird claims. The principal development work has been upon the Greyhound, and consists of the main tunnel, 250 feet in length. This tunnel follows the vein out of the Greyhound into the Red Bird claim. At 30 feet from the mouth of the tunnel there is a crosscut 30 feet to the westward and 20 feet to the eastward. It is claimed that this crosscut shows vein matter for a distance of 50 feet. Another crosscut, 85 feet beyond the first, also shows vein matter 40 feet thick. The last 100 feet of the tunnel is in broken ground. On the Parnell claim there is an open

cut showing a 2½-foot vein. On the Black Hawk a tunnel follows the veins for 130 feet. Many of the open cuts and pits along the several veins indicate their extent and value.

Wood consisting of pine, oak, and juniper can be had from the neighboring mountains. Water for domestic purposes is obtained on the claims, while an abundance for milling purposes can be had from the Hassayampa, near by. (Condensed from the statement by O'Boyle).

COMMODORE GROUP.

Weaver district (Martinez), Yavapai County, comprising the claims known as the Anaconda, Leora, and Oversight gold-bearing lodes. Ore refractory, valued at $35 to $40 per ton. A shaft 15 feet deep has been sunk on the Anaconda and one of 117 feet and another of 135 feet on the othe. claims. Drifts, 70 feet.

JOHNSON MINE, STANTON.

This mine, opened upon the great quartz vein which appears to have been the feeder of the enormously rich placer deposits of Weaver and Rich Hill, was worked for many years by the hermit Johnson, whose bones now lie buried under an immense wall of the lode from which he was stoping ore. He kept two or more arrastras at work on selected high-grade, free-gold quartz. The vein lies quite flat or at a low inclination, so that one may get about on the foot wall without the aid of ladders. But this inclination, is variable. There are several tunnels upon the property. In some places large branches of massive galena are found in the vein. Coarse gold is not uncommon, but is found in pockets and bunches, while the surrounding quartz is nearly barren. A specimen of "spike gold," valued at $80, was obtained by me some years before the death of Johnson by purchase from Stanton. Showing it afterwards to Johnson, he recognized it as one of the specimens he had taken from his vein. There seems little reason to doubt that this vein and the "Leviathan" of Stanton are one and the same, and that it extends over the summit of Rich Hill. The gold no doubt occurs in coarse masses in pockets, with the intervening portions of quartz quite barren.

At the time of the opening of the mine by Mr. T. A. Conlee the tunnel was reported to be 200 feet long. The vein measured 6 feet between walls and carried from 1½ to 3 feet of sulphureted pyritic ore and the balance of the vein free milling quartz, valued at from $8 to $10 per ton. The Johnson mine is now being extensively developed by experienced miners, and it bids fair to become one of the great gold mines of the Territory.

FREE GOLD GROUP, YUMA.

In the Chocolate Mountains of Yuma County, 6 miles easterly from the Colorado River and Nortons Landing, about 6 miles northerly, as the crow flies, from the Old Clip Landing, and 60 miles northerly from Yuma, is situate the Free Gold group of mining claims. The country formation is of porphyry, quartzite, and granite, through which the ledge has its way in a northeasterly and southwesterly direction, defined for 8,500 feet on this group. The group consists of the Renown, Quien Sabe, Little Mint, Cashier, Hidden Treasure, Missing Link, Celestina, Free Gold, Arastra, Siwash, Rio Vista, and Skookum claims, but the development is principally done on the Free Gold, located on a horseshoe-shaped basaltic porphyry mountain. Through the hills of this mountain, and two lesser spurs of porphyry, a fruitful green-granite belt cuts, on a northeast and southwest strike; about midway of this belt is situate the quartz vein of the Free Gold claim, and 240 feet above the base of the mountain is the main working shaft. From the collar of the shaft to the ore platform is an elevation of 140 feet, and a distance by skidway of 230 feet to where ore is delivered, the car being handled by whim hoist cable.

The development of this claim consists of 209 feet of shafting, 222 feet of drifting, and 75 feet of tunneling. The working shaft has a depth of 130 feet, with north drift at the bottom, 27 feet in ore. At the 75-foot level there is a north drift 125 feet in length, and 100 feet of the No. 1 ore chute on this drift is stoped to the surface. The average thickness of the pay streak is 16 inches, while the whole vein, all carrying more or less gold, is 2 feet in width. The south drift at the 75-foot level is 70 feet long, and ore chute No. 2 was struck 40 feet from the shaft. No stoping of account has been done here. In the north drift, the heading at 125 feet from the shaft is just entering ore chute No. 3. This chute is proven by shafts and cuts and by visible gold in outcrop for 150 feet in length. This is virgin territory. A tunnel 100 feet south from the working shaft is 75 feet long, and is all in

ore chute. No. 2 showing a thickness of from 8 to 20 inches of $30 rock. Thus there are three well-defined ore chutes, with from 40 to 60 feet of semibarren ground, save occasional pockets of rich ore intervening. The vein is from 2 to 5 feet thick, with small walls, and gouge casing on both foot and hanging. The ledge dips from horizontal 80° to the east, and may be clearly defined, in place, for 1,000 feet. The average thickness on the surface is 1 foot.

Copper occurs rarely as a pyrites and cuprite; silver lead, infrequently, as galenite; and iron pyrites, at times in nuggets and kidneys, and disseminated in cubes and flakes through the quartz. These, with brown hematite, high in gold values, constitute the concentrating factor.

The ground stoped is fairly timbered, and is fitted with a man ladder and skidways. In the drifts is iron strap tracking and gunboats for buckets underground. Improvements on the surface include a blacksmith shop near the shaft, a Davis patent automatic horse-whim hoist, with 200 feet of five-eighths steel cable and 2 steel buckets of 300 pounds capacity. There is a skidway track to the ore platform on an incline of 35°, and a wagon road over wash and mesa a distance of 5 miles, connecting mine and mill, over which four good horses or mules will haul 8 tons both ways.

On a point of mesa, on the county wagon road, is erected a modern 5-stamp mill, with narrow mortar, 850 pound stamps, inside plates, 4 by 12 feet silver-plated copper amalgamating apron plate, 6-foot canvas belt springer concentrator. Blake rock crusher with self-feeder. A steam plant of sufficient capacity furnishes power. Wells 30 feet deep furnish an ample supply of water, and an additional flow can be secured by driving the wells deeper.

The ores of the Free Gold claim and group are essentially free milling, wire, shot, and flake gold, spooning freely from clean-grit, blue-white, friable quartz. The freest spoonings are from honeycomb quartz, and the highest values are held in a brown hematite that gives from 2 to 30 ounces of gold per ton. A low percentage of yellow-colored iron pyrites is found, which is rich in gold, The rock will plate, under a competent mill man, 60 per cent of its assay value, and an average mill rock of $30 per ton can be mined. In conjunction with the cyanide process, 85 to 95 per cent of the assay values should be saved. The favorable iron matrix, holding the gold fine and free, renders this a premium cyaniding proposition; the lead contained in the ores is in too minute a quantity to be considered, and it has been practically demonstrated that when copper compounds exist in a state physically hard, the cyanide solution does not act on them, and there are no other refractory minerals in the ore.

The vein is a true fissure vein in every particular, and there is a clear improvement in the thickness of the pay streak and in the gold values—not in occasional swells, but steadily and peculiarly regular from the surface to the lowest levels.

Veins on the San Francisco River.

A group of gold-bearing veins on the right bank of the river some distance above the placers gave promise of profitable working, especially as the water of the river was abundant for milling purposes and the conditions were favorable for cheap working.

In March, 1898, it was reported that the Evans-Vanhecke Gold Company was running a 20-stamp mill regularly on ores from the veins in the district, and that it was the intention to increase the plant by the addition of 30 more stamps.

Rochester group of gold claims, Caribi district.

The following memorandum notes were made during an inspection in 1896, since when much work has been done on each of the claims:

Great Eastern.—Quartz ledge trends north 50° east, dips easterly 70° and 75°. A white quartz at croppings. Has the appearance of quartz which often carries coarse gold. Pit about 25 feet deep. Vein over all about 48 inches wide. Sixteen inches of quartz on the hanging wall and 12 inches on the foot. Walls soft and clay like; color, light gray. Some galena seen.

Grand Central.—About 1,000 feet higher than the camp on the west side of the mountain. Red and gray volcanic or plutonic rocks porphyritic. A "blind ledge" almost in the midst of a large amount of blue clay and decomposed porphyry. When oxidized the iron oxide becomes ochery yellow. This lode shows free gold. Course of vein is north 30° to 40° west, dip southeast at angle of 46° to 60°. A shaft was about 100 feet deep. The clay at the bottom quite damp. Thickness varies, at one place 4 feet. Advised cross cutting to the west. Some 30 to 40 tons out on bank.

Grand Mogul.—Several ledges and spurs, on a narrow ridge between two gulches or arroyos. Rock is red porphyry. Little or nothing done on the croppings. A tunnel started below them.

Little Buckhorn.—A bulging vein. Trend north 30° west, south 30° east. Dip east. From 18 to 24 inches wide.

Big Buckhorn.—On the top of a ridge. A quartz vein trending north 40° west. Dip is easterly 75° to 80°. Fine "ribbon" quartz. Walls have a soft gouge. There are some stains of copper. This vein can be cheaply mined.

Azure King Group.

The Azure King group of six mining claims in a solid block, and consisting of the Azure King, Azure Queen, Azure Prince, Azure Chief, Copper Glance, and Casheer, is situate 20 miles north from the town of Yuma, opposite the Picacho gold mining district of San Diego County, Cal., and three-fourths of a mile from the Colorado River and steamer landing. The country formation is of porphyry, slate, and quartzite, through which the ledge has its way in a northwesterly and southeasterly direction across the country rock and strata, strongly in place. The vein matter is of talcose schist and soft blue slate, with a gangue of white quartz between smooth gouge cased walls, with "slicken sides" markings to the greatest depth of workings, and holding a thickness of vein from 2 to 15 feet and a pay gangue from 20 inches to 10 feet thick. Development consists of numerous shafts along the line of vein from 20 to 80 feet deep, which, without crop, and where the lode cuts across the canyons, clearly defines the vein 7,500 feet in length. To the 30-foot level in five shafts the ore is in body and large patches. Below this level, as shown in two 80-foot shafts, the ore occurs in kidneys and bunches, the vein between smooth walls with a dip of 80° from horizontal to west.

The ore occurs as a chalcocite (copper glance), cuprite (red copper oxide), malachite and azurite (green and blue carbonates), and generously of chrysolla (a hydrous silicate of copper). No antimony or arsenic is found, thus assuring a premium quality of copper of great tenacity and ductility, suitable for the manufacture of electrical appliances and other high-grade metal fabrics.

There are numerous parallel lateral feeders and stringers of clean ore, dipping and tending toward the mother vein. These feeders are strongly mineralized and are characteristic of the veins through their entire length. The intervening country rock for a width of from 50 to 150 feet is stained with copper oxides and silicates from these and lesser interlacing veinlets of ore.

In addition to the regular northwest and southeast veins, there are two parallel north and south cross veins highly mineralized with cuprite and chalcocite. Cross vein No. 1 cleaves its way through the Copper Glance claim, outcropping in a saddle between the highest mountain peaks in the district, showing a 4-foot width of vein, thus furnishing superior tunnel sites to be run as an adit, with and on the vein, gaining 1 foot in depth to each 2 feet of drives, and a depth where the two veins intersect of about 250 feet from surface.

The assays of ore as found give: Crude hand assorted—No. 1, gold $47.50, silver 20 ounces, copper 30 per cent; No. 2, gold $22, silver 14 ounces, copper 18 per cent. The ore in place as it came from the mine, unassorted, gave return of gold $6, silver 4 ounces, copper 10 per cent. If not treated on the ground by concentrating, the ore can be hand assorted to 25 per cent of copper. This was the method employed at an early day when these claims were first worked, and the ore shipped to Swansea, England, by way of river and Gulf of California. It is a straight siliceous ore.

There are two mill sites connected with the Azure King group, one on the bank of the Colorado, thus affording a navigable river outlet; the proximity of the group to the river and to Picacho, just across the river, which has a daily stage and United States mail from Yuma, also affording exceptional accessibility. (Yuma Sun, Vol. III, No. 38, December 28, 1898.)

Gold Placer Deposits.

Papagueria.—The wide extent of country lying to the west and south of the Tucson Mountains, especially the region south of the Southern Pacific Railroad to and even beyond the boundary line, is inhabited largely by the Papago Indians and is known as Papagueria. It has long been known as a region of placer gold, and the Papagoes have taken out from their waterless placer deposits a large amount of gold by "dry washing." As early as 1875 Governor McCormick reported that

these Indians had for years brought more or less of gold dust to the Tucson merchants, and that in one month of that year one firm purchased over $3,000 worth of gold from them.

Horseshoe Basin placers.—The gold-bearing gravel deposits of this name are upon the southeastern flank of a spur of the Quijotoa Mountains and have been known and worked for a century or much longer by the Indians. It is probable that these placers were one, at least, of the sources of gold brought in by the Papagoes and they may have been the main source. The following estimate of the amount of gold annually produced by the Indians is from a letter received from Mr. W. F. Day, January, 1899:

"The placer mine in the near vicinity of Quijotoa worked by the Papagoes in their crude way are producing annually between $6,000 and $7,000 worth of gold.'

The placers are extensive, and no doubt machinery will someday be applied to work the ground on a large scale, thus creating an important industry for Pima County.

TEMPLE BAR MINING COMPANY.

Location on the banks of the Colorado River, in Mohave County, about 100 miles above the Needles. A French company under the general management of Captain Delmar. In September, 1895, the late "Dan de Quille," wrote of the Temple Bar enterprise as follows:

"*Mining on the Colorado.*—The altitude at the mouth of the Rio Virgin is only 800 feet above the sea level. The Colorado at the mouth of the Rio Virgin is approached by a low bottom land. It is on this part of the Colorado, on the Nevada side, that the Temple Bar Mining Company is operating in a novel way. They own a big bar on the river, the gravel in which yields from 60 cents to $1.25 per cubic yard. (Another account gives the average as 20 cents a cubic yard.) To work this bar two big barges have been constructed, between which revolves a monster wheel, by means of which water is raised to the height of 250 feet, and forced through nozzles that play heavy streams upon the auriferous gravel. By this device it is expected that 3,000 yards of this gravel can be washed in a day. At this rate it will require many years to work out the bar."

The company expected to begin washing on the 15th instant and are now probably in full blast. The Temple Bar Company have a fine location. Their claim is situated just below the mouth of the Grand Canyon, where the gold, rushed down through the great rocky gorges above, would find lodgment in the flat shore of the Nevada side of the river. Above the Grand Canyon is Marble Canyon, and about the first place where fine gold can settle is where this company are at work, which is about 10 miles above the mouth of the Rioville River, a small stream a short distance above the mouth of the Rio Virgin.

GREATERVILLE PLACERS.

The Greaterville Placers, in Pima County, about 40 miles from Tucson, are on the eastern slope of the Santa Rita Mountains, about 3 miles south of Rosemont. They are nearly opposite the high peak of the range known as "Old Baldy" and as Wrightsons Peak, which reaches an altitude of 10,000 feet. The placers are about 5,000 feet above tide in their higher portions, this being the height of the upper ridges of cemented débris flanking the central mountain mass. Several dry creeks or gulches here take their rise and slope gradually away into the broad valley beyond. The chief valleys or dry gulches, which mark the flow of ancient streams or brooks of considerable volume, and which even now are occasionally flooded by heavy rains, are known as Hughes Canyon, Fish Canyon, Sawmill Canyon, Gardner Canyon, Chispa Gulch, and Left Fork Canyon. The general descent is to the southeast. All these and the tributary gulches are more or less gold bearing. These placers have been worked for many years. They were described by Colonel Black in 1890. (Arizona, the Land of Sunshine and Silver, etc., J. A. Black, commissioner of immigration.) He states that the placer mining there had been found profitable for fifteen years, though conducted in a very crude way. The town of Greaterville had at that time about 150 inhabitants. Placer gold has been found almost everywhere. The gravels and sands of the beds of these dry gulches or dead streams are charged with placer gold in little pellets and grains and even in nuggets weighing ounces. Mr. Anderson, an old resident of Greaterville, has seen many which weighed from 3 to 4 ounces, and one nugget from Chispa Gulch sold for $750. This gold is not confined alone to the beds of the gulches, but may be found higher up in the sides of the mesas and even in the cemented débris of the higher edge of the slope. The drainage must formerly

have been in great force and volume from the high mountain, as everywhere around the ranges of Arizona, to have formed such extensive marginal slopes, since cut into by more modern and constant floods. We here, too, have the phenomenal condition of canyons commencing on the eastern side of the main ridge of the mountains and extending westward through the higher and seemingly the harder and more resisting parts of the range, as, for example, the Box Canyon. This heads or commences at the upper edge of the gravelly slope of the eastern flank of the mountains and cuts directly through the whole range to the Santa Rita Valley on the west. For a great part of the distance it is between high, solid walls of granite and quartzite, and it hardly seems possible that the gorge is wholly one of erosion. Analogous conditions are found in the mountain ranges west of the El Grupo or San Joaquin rancho, in Sonora, where the entire range is cut through, the eastern valley draining into the western toward El Plomo.

The placers of Greaterville have the reputation of having contributed some millions of dollars in value in gold to the mineral production of Arizona. No reliable statistics have been kept. Formerly hundreds of placer miners or gold washers were at work where ten are found now. The first to arrive secured the richest deposits, and gradually the yield per man per day has diminished until now the placers are regarded as good for ordinary wages only, and, in fact, many of the Mexicans who are now washing do not average probably over 75 cents to $1 a day. The absence of persistent flowing water is of course a great disadvantage in washing out dust, but its absence permits of cheaper digging and raising the pay from the bedrock.

As a rule, the deposits are comparatively shallow. Deep pits and shafts are not required. The method of working is mostly that practiced by the Mexicans. A very narrow grave-like pit is sunk to a bedrock and the "pay" is sufficient. Other smaller pits are dug at a little distance apart and the pay between them is excavated and hoisted by windlass to the surface. Water being scarce, for most of the year at least, is brought to the pit in canvas bags by donkeys, and the gravel is washed by the common placer miner's cradle, such as is used largely by Chinamen in California. As this is a slow and tedious method of handling the pay dirt, no large returns can be expected. It is not possible to form a reliable estimate of the general average value of the ground per cubic yard. Of course, much depends upon the selection and upon the position of the gravel. The usual measure of the gravel is the "ajori" or box with a capacity of ten buckets of dirt. This may yield at the present time from 50 cents to $1, but possibly it was not strange to get nearly an ounce from the same quantity. Pits and cuts and piles of washed gravel all over the flats in most of the gulches attest the great amount of labor performed and the apparently complete exhaustion of the ground, yet there is a plan on foot to wash it on a large scale by water brought in from the higher mountain streams. The gravel, it is said, will be raised from the beds of the gulches by the modern powerful dredging and excavating machines, and will be dumped into elevated sluices which may be moved from side to side so as to give room for the discharge of tailings. Water will be impounded in storage reservoirs. From the extent of the placers only, estimated by old residents, these are now available. The limits are approximately 7 by 5 miles, or 35 square miles.

The fineness of this placer gold is said to be such as to make the gold worth $17 per ounce, but usually it is taken in trade at the local stores at $16 per ounce.

It is not possible to state with certainty where this gold originated and from what veins or deposits it has been derived. But a rapid inspection leads to the opinion that it has come from many veins of moderate size cutting through the bedrocks of conglomerate sandstone and granite, all of which are represented, as also shales and limestones, and here and there an eruptive dike of plutonic rock. These formations, as elsewhere shown, appear to be equivalents of the old Cambrian and Silurian formations of the middle part of Box Canyon, near Deerings Camp, and also of the red sandstones and shales of Old Hat district, on the northeast side of the Catalina Mountains, where they are traversed by the gold-bearing quartz vein known as the Silver Bell. These old fragmental rocks appear to be gold bearing to a high degree. Thin seams of amorphous hematite traversing the conglomerate at Deerings Camp contain gold in visible grains, as pointed out to me by Mr. Deering. A great number of such thin knife-blade seams would, under the enormous degradation and erosion of geologic ages, contribute largely to the placer deposits.

There is also a well-defined mineralized contact placer between the massive limestones and the quartzite and conglomerate series. This is gold and lead bearing. It appears as a well-mineralized lode containing quartz as a veinstone, with a heavy mineralization of iron pyrites and galenite. The croppings are very rusty and are highly charged with lead carbonate and fragments of undecomposed

galena, as more fully described elsewhere. Free gold may be found by panning these rusty ores, and it is not improbable, as claimed by Deering, that this extensive contact lode contributed a large part of the gold of the Greaterville placers. (Vide "Golden Gate group.")

LOST GULCH PLACERS.

Placer deposits of considerable extent and value have been worked for years in Los Gulch Globe district. These deposits appear to have been supplied by the disintegration and erosion of a multitude of small veins traversing the granitic rocks of the region. (Vide Lost Gulch mines and Sultan group.)

HUACHUCA MOUNTAINS.

Placer gold ground is found in the Huachuca Mountains. It is reported that placer miners are constantly at work near the Harper mine and making good wages.

PLACERITAS, HASSAYAMPA.

The placers along the Hassayampa above Walnut Grove, at Placeritas, have long been known and worked, and are regarded as good-wages mines.

WEAVER PLACERS.

The gold placer deposits of Weaver are celebrated for their richness and the coarseness or weight of the grains of gold. They are at the southern base of the mountains and west of the Hassayampa at the foot of the Rich Hill at Stanton. They have been worked for many years—thirty or more. The deposits of gravel are not deep and heavy. The gold appears to have been broken out from a not far distant vein. The soil is red with iron oxide and the gravel is chiefly quartz veinstone. The deposit on the top of Rich Hill was found in value from an area of less than 1 acre of ground, along an old river channel.

A score or so of men are now working on these placers from year to year, and it is supposed that they get from $2,000 to $4,000 in value per month.

The Rich Hill channel is noted for its coarse, heavy gold. Small scale gold does not occur there. It has not been transported far from its original matrix, The same observations apply to the placers of Weaver, which no doubt had their source in the same vein from which Rich Hill was supplied. It seems strange, however, to get such coarse gold on the top of a mountain. Tom Connell, who mined extensively on the top of the hill, assured me that he could not get even $10 worth of fine scale gold, but he took it out in coarse masses and nuggets. One of the largest found was worth $400, another one $800, and another $150 in round figures. Three lumps taken out by him were worth $1,008. Nuggets to the aggregate value of some $3,000 were taken out within a small area. Pedro Lucero, at Weaver, found one piece worth about $450.

LYNX CREEK PLACERS.

These placer deposits are about 8 miles east and north of Prescott. They have been worked more or less since 1863, but irregularly and intermittently. A tract on these placers of about 300 acres has been bought by an English syndicate and equipped with a hydraulic plant, but the scarcity of water prevents constant working. Hundreds and thousands of dollars have been taken from these placers and millions remain. The gravel averages 25 cents per cubic yard, and there are thousands of acres.

GOLD ON THE SAN FRANCISCO RIVER.

Extensive placer deposits are found along the San Francisco River about 7 miles above Clifton. It was proposed some years ago to work these banks of gravel by the hydraulic process, and a large sum of money was expended in sending out sheet iron for a pipe line and a machine plant to bend and rivet the sheets into pipe. The want of adequate fall and space for the tailings caused the abandonment of the enterprise.

SMITH DISTRICT PLACERS.

Placer mines of the Santa Rita Mountains were described in 1875 as the Smith strict placers, but their position was not stated. Being at that date but newly iscovered and worked, the reports from these produced quite an excitement in ducson. The grains of gold were coarse and heavy, some of the nuggets being

worth at least $50, and one was found worth $90.50. Heavy lumps of gold have been found on the northeastern slope of the Santa Catalinas, and were perhaps derived from the Southern Belle lode or from other veins in that region.

CANADA DEL ORO.

The placers of this great wash on the northeastern slope of the Catalina Mountains have long been known and worked with variable success.

CHEMEHUERIS PLACERS.

According to the commissioner of immigration of Graham County, the dry placers of the Chemehueris Mountains continue to add thousands of dollars annually to the wealth of the world.

M'CABEL.

Situated about 20 miles east of Prescott, opened to a depth of 500 feet and equipped with a 10-stamp mill and producing regularly, but the amount is not known.

The Little Jessie mine is about 2 miles distant and has also been a great producer.

CROWN POINT.

In Yavapai County near the Hassayampa below the site of the Walnut Grove dam. Opened to the depth of nearly 300 feet showing a ledge reported to be about 4 feet wide and with bodies of high-grade ore.

MAHONEY MINE.

A well-defined auriferous quartz vein 4 to 7 feet in width, nearly vertical, and prospecting well in free gold. Location about halfway down the Hassayampa Canyon on the left side. This ore is very red, the iron being in the condition of hematite.

BILL NYE AND WADSWORTH.

Two claims of these names have been located by Alex. McKay in the Quijotoa district on the northern side of the range. These claims are gold bearing and form a portion of a group located and worked for copper ore and noted in this report under the head of copper.

LOWDHAM GROUP.

The discovery of a gold-bearing vein by Mr. Alex. McKay on the south side of the Quijotoas is also reported. Three claims have been located on this lode—the the Lowdham, Robin Hood, and the Friar. Other claims are known as the Ben Hur and the Ben Lomond. The remarkable specimens of crystallized heavy spar (barite) generally known among the miners as "fossil oysters" are taken out of cavernous openings in some of the lodes of the Quijotoas. The Museum of the School of Mines at Tuscon is indebted to Mr. McKay for several fine specimens. Placer deposits are found around these mountains, particularly below the Ben Lomond claim and at the other end of the range at Horse Shoe Basin. (See under heading of placers.)

The Bonita and Gold Coin Group of gold claims are in the vicinity of these placers and the lodes on them may have been the source of the gold.

FRESNAL GOLD MINES.

The discovery of remarkably rich gold and silver ore on the western side of the Baboquivari range of mountains southwest of Tucson has been one of the most notable events of the year in mining circles of this Territory. The samples brought in for assay at the Arizona School of Mines show free gold and rich silver ore. The combination is very promising, and the samples frequently assay as high as $1,000 to the ton, but this is upon hand-picked samples. Some of the hand-worked ore, as sacked for shipment, has, however, run as high as $600 per ton.

The veins were discovered by Henry Wicks and J. D. Burrow, prospectors, associated with the Allison Brothers, of Tucson. The discovery is one of the results of the system of making reliable assays at the Arizona School of Mines for a

nominal sum as established by the legislature. Mr. Allison systematically sent in samples from croppings for assay, often getting nothing to encourage him, until the prospectors came across the croppings of this ledge. Mr. John Brockman, of the Pearce or Commonwealth mine, has purchased Mr. Burrow's interest in this property, and active mining operations will be commenced without delay. Considerable shipments of high-grade ore were made in 1898 and have been continued in 1899. The shaft has been sunk deeper and the lode in the bottom shows free gold and looks promising for the future.

Some of the earlier samples from the newly discovered ledge gave the following encouraging results:

	Silver.	Gold (value).
	Ounces.	
Two sacks	51	$248.04
Eight sacks	95	186.08
Average sample	36.7	88.88
Large rich piece	247.5	1,498.59
Tunnel sample	2.5	6.88

This discovery has stimulated the active prospecting of the Baboquivari Mountains, and many other locations have been made and are now being prospected and developed.

MONTERREY MINE.

This property, also known as the Kuhn Kahn, so named from an old Papago chieftain, is situated in the Cababi mining district, about 80 miles west of Tucson and about half a mile west of the Huntington, on Desert Well. A Papago village is near this well and the mine. This location, of the usual length, 1,500 feet, and a width of 600 feet, was made upon a very well defined auriferous lode or vein cutting vertically through a chocolate-colored porphyry. This vein averages from a few inches to 18 and 20 and 36 inches in width. It crops out boldly along the surface for nearly 300 feet and has been prospected for that distance by a series of pits and open cuts and two shafts, from all of which gold-bearing quartz has been taken. The deepest shaft is 90 feet; a second shaft is 45 feet deep. The quartz shows ribbon structure. Selected portions of the ore were carted away and shipped to smelting works; the remainder was left on the dumps. A mill test was made upon about seven tons of this quartz at the Arizona School of Mines' 5-stamp battery mill. Two separate runs averaged $11.22 in value saved on the plates. The tailings averaged $8.78 per ton and are found to be adapted to cyaniding. The gold generally in this ore is extremely fine, and probably the whole ore could be cyanided directly with success. There is considerable lead carbonate present, indicative of the presence of galena at a lower level. The ore could be worked at the mine by pumping water to it from the Desert Well or by carting it to the well or to the Quijotoa wells, about 6 miles west of the mine.

ANDERSON GROUP.

At and near Greaterville are several claims in the midst of the placer ground traversed by lodes carrying gold and silver and lead with iron pyrites and sometimes blended in a quartz veinstone having the characteristic structure of true veins. These claims comprise the Treasure, the Beniger, West Point, Granite Mountain, Fulton, Silver Crown, U. B. and A., and the Arastre.

The Treasure has three openings on it, the deepest about 40 feet. The vein follows the contact between limestone, the foot wall and quartzite the hanging wall. Assays of the ore from this claim as selected for shipment gave, silver, 65 ounces; gold, value, $5; lead, 48 per cent.

The Beniger.—Occurs in limestone. Seventy tons of ore out in the dump will assay, silver, 40 ounces; gold, value, $3.

The West Point.—In porphyry and granite will yield ore carrying, silver, 113 ounces; gold, $7 in value.

The Granite Mountain.—In porphyry and granite yields ore assaying, lead, 44 per cent; silver, 90 ounces.

Fulton.—In limestone and slate lead, 40 per cent; silver, 30 ounces; gold, value, $8.

Silver Crown.—In limestone lead, 35 per cent; silver, 35 ounces; gold, value, $2.
U. B. and A.—Silver, 300 ounces; gold, value, $8.
Arastre.—A small vein in crystalline rocks will yield ore assaying $27 gold.

General run of shipping ores, Anderson group.

Name of claim.	Lead.	Silver.	Gold.
	Per cent.	*Ounces.*	*Value.*
Treasure	48	65	$5
Beniger	40	.....	3
West Point	.....	113	7
Granite Mountain	44	90	.....
Fulton	40	30	3
Silver Crown	35	35	2
U. B. and A	.....	300	8
Arastre	.....	.....	27

These figures show approximately the values in the three metals of the ore culled for shipment. The use of proper crushing machinery and concentrators would give a larger product and higher values and at less cost.

WHITEFORD GOLD MANUFACTURING COMPANY.

The property consits of five claims, the Confidence, Last Chance, Gold Rock, Reliance, and Walker. These are located upon gold-bearing quartz lodes in which the gold is partly free and partly in combination with pyrites. The main lode is reported as averaging 3 feet in width. In December, 1898, the company was working two shafts and driving a tunnel upon the lode. Location on Mineral Creek 2 miles north of the Ray Mines. There is an abundant supply of water, but the timber is limited.

GOLD CONTACT LODE.

Under the name of Golden Gate series several claims have been located and worked above the Greaterville gold placers in Pima County, on the east side of the Santa Rita Mountains, about 45 miles from Tucson in a southwesterly direction. It is between Rosemont and Greaterville, a quarter of a mile to the west of the main road between these two places and at an elevation of about 5,000 feet, in the oak-tree region, salubrious and pleasant at all season. The lode follows the central plane between the old Silurian, or Devonian, limestone above and the sandstones and quartzites below. These foot-wall rocks, in their turn, rest upon a foundation of granite. The plane of contact occupied by this lode is approximately the same which is marked for miles in distance to the northward by deposits of auriferous and argentiferous copper ore. At the Backbone and the Eclipse, two copper-bearing claims west of the Rosemont, the limestone seems to be much nearer to the basal quartzite than it is farther to the south. The heavy beds of conglomerate and sandstones thin out, while the lower quartzite next to the granite retains its full thickness. It is between these two formations—the quartzite below and the limestone above—we find the beds of copper ore.

This lode has been prospected and worked to a slight extent, and the best ore sacked for shipment to El Paso and other smelters. It is an auriferous lead ore. There is also a notable portion of pyrites mingled with the galenite, and this may be the source of the gold. At and near the surface, and in fact as deep as the workings have been extended (not over 60 feet) the ore is very rusty and ferruginous, indicating a strong mineralization with iron pyrites which will no doubt make its appearance abundantly in depth or below the water level. The gangue or veinstone is quartz. The width of the lode ranges from a foot to 4 and 6 feet or more. The nature of the hanging wall suggests possible cavernous enlargements and large bodies at intervals. It is observed that there are branches or stringers extending upward and outward from the lode into the limestone. It is probable that the contact is also marked by the presence of a porphyritic or plutonic dyke, the foot-wall rock in places appearing like a rusty, decomposed, intrusive rock, rather than a sandstone or mechanically-formed rock.

The general direction or course of the contact is northwesterly and southeasterly, and the dip is to the eastward at an angle of from 45 to 60 degrees. The slope of the mountain at the south end is such as to cut the contact diagonally,

and thus permit the lode to be attacked by mining upon its end. A tunnel can be run in upon the course of the lode so as to obtain "backs" of from 100 to 300 feet in the distance of the length of two claims. The development by working consists of several incline pits of slight depth at intervals along the croppings, as shown in the following tabular exhibit of the assays of samples from the claims and pits named:

Name of claim.	When taken.	Silver.	Gold.	Value.
1. Conglomerate	Pit No. 1	Trace.	0.53	$10.95
2. Golden Gate	40-foot incline, 6 feet	Trace.	.54	11.26
3. Golden Gate	No. 3 opening, 18 inches	Trace.	.28	5.79
4. Golden Gate No. 2	20-foot pit, 12 inches	8.71	.71	14.67
5. West Side	Top of shaft, 60 feet deep	Trace.	.82	16.95

Sample No. 2 was from the so-called talc, supposed to be of no value. The aver age in gold value of these assays is $10 per ton. The ores show free gold in the pan or horn spoon by washing. All the samples contained lead in the form of galenite and the carbonate, some of them of high grade, but the percentage was not determined. The pulps of the above samples, being mixed together and then concentrated by washing out in a pan, gave 15 per cent of concentrates averaging 35¼ per cent of lead, 9.14 ounces silver, and 1.89 ounces of gold, valued for gold alone at $39.06 per ton. The clean tailings, without the slimes, amounted to 48 per cent, and the slimes, lost, by difference, 37 per cent. The tailings carried 1 27 ounces silver, 0.40 ounce of gold, valued at $8.28 per ton. Another concentration test of lump ore from the 40-foot incline shaft on the Golden Gate gave 20 per cent of high-grade concentrates assaying: Lead, 30 per cent; silver, 4.20 ounces; gold, 2.91 ounces, value, $60.10. The tailings gave: Lead, not determined; silver, 1.02 ounces; gold, 0.36 ounce, value, $7.44. The tailings, being washed clean of slimes, are in a good condition to be treated by the cyanide process. The concentrates can be sacked and shipped to a smelter. The hauling to Tucson or Vail's Siding would cost $3 per ton and the railroad freight about $2.50. The locations are known as the Conglomerate, Golden Gate, Golden Gate No. 2, Golden Gate No. 3, and the West Side, besides other locations for water and mill sites. There is another group of claims upon veins traversing a massive conglomerate of granitic rock. These veins are small, but rich in free and combined gold, and are known as the Gold Fish group, comprising Gold Fish, Carbonate, Golden Fleece, and Golden Eagle.

THE SULTAN GROUP.

A series of gold-claim locations in the Globe mining district, Gila County, is known under this title. The group consists of the Badger, Cedar Tree, Cedar Hill, Peacock, Keystone, Homespun, Transit, Free Silver, and Little Man. The veins of auriferous quartz traverse granite rocks of similar nature to those in which the Lost Gulch veins occur. Diorite is also reported. The group consists of eleven claims, all contiguous. They are located 8 miles from Globe, in one of the most prolific districts in the Territory. There are no buildings and no machinery upon the claims, and none of the shafts has as yet reached a depth of over 140 feet. Both the hanging and foot walls are of a diorite formation. The veins have a northeast and southwest trend and vary from 2 to 5 feet in width between walks in the various openings. In most of the claims the ore is free milling above the 50-foot level; below that depth it is more or less complex, being a siliceous quartz, carrying iron pyrites and gold, which will concentrate about 10 to 15 tons into 1. There are no silver minerals or copper or lead above the 100-foot levels to interfere by fouling the quicksilver. The gold is finely disseminated through the quartz and is occasionally visible in the richer portions, and pans well at the grass roots.

The principal development is on the Badger claim. An incline shaft is 140 feet deep. The last 20 feet of depth is under water, which prevents examination, but the material taken out and now on the dump shows a value in gold of from $6 to $8 per ton. It is a heavy ore and would yield 1 ton of concentrates to 10 tons of ore. From the 120-foot level a drift is run southwest 30 feet, showing an average width of 5 feet of ore; also a drift along the trend northeast 27 feet, that shows about 2 feet of ore. Taking these drifts along the trend of the vein, as well as the ore in the shaft, from the lowest level to surface, including all openings, makes an average of 3 inches. A drift at the 65-foot level southwest 27 feet, also northeast 25 feet, shows a uniform body of ore, all of which is easily mined. The cost

of mining it should not exceed $1.50 per ton; very little powder is necessary to extract the ore. The average value of the ore of this shaft and drifts by furnace assays and mill run is $11.50 per ton, but it is more base than free milling. The product above the 120-foot level would concentrate 15 tons into 1, and there is upon the surface dump about 170 tons.

Badger Crosscut No. 2.—This opening is 300 feet southwest of the Badger shaft. It is an open-cut tunnel, showing the vein 115 feet below the croppings. A winze 25 feet deep connects with the workings of an old location shaft 40 feet deep. The workings show an average width of ore of 2½ feet. It is claimed that this ore will yield from $12 to $14 on the plate of a stamp mill.

Keystone Claim.—Located on the north side line of the Badger; has a tunnel 70 feet long. A winze sunk 20 feet from the mouth of the tunnel is 40 feet deep. Ore, containing some lead-ore minerals, assays from $4 to $5 per ton.

Cedar Tree Lode.—Tunnel, 110 feet; continuous body the whole length, both in roof and floor of ore, averaging 10 inches in its root and 1 foot along its bed; 40 feet from mouth of tunnel a winze is sunk 40 feet; ore continuous, gradually widening, at lowest point uniform width of 3 feet; assay value $15, concentrating 15 to 1. Some of the surface ore is very high grade and free milling. This is considered the best mine of the Sultan group.

Cedar Hill No. 1.—Opened by tunnel 180 feet; about 150 feet from tunnel and directly over it a shaft was sunk 40 feet from surface, showing 6 inches of high-grade ore. Water can be easily secured for a mile on this group of mines and without heavy expense, and wood can be had for the cost of cutting, there being an abundance on the locations. The ore bodies in the various openings on the mines of this group show remarkable strength and continuity. With proper facilities they can be easily mined.

KASSER GOLD MINING COMPANY.

Several locations upon Lost Gulch, in the Globe mining district, have been worked under this title, and from one of the veins traversing granite rocks a large amount of high-grade gold quartz has been milled at the company's mill near by. The gold is associated with galenite and iron pyrites, and the decomposition of these ores has produced some fine specimens of wulfenite and of vanadanite. The tailings average about $3 per ton. The property is near the Black Warrior copper mines and is not far from the Sultan group. There are deposits of placer gold below all these veins in the gulch or arroyo and they have been extensively worked. The rocks of the lower portion of Lost Gulch are finely laminated mica slates or schists.

ORO BLANCO GOLD MINING DISTRICT.

Oro Blanco district receives its name from the fact that most of its placer gold is so largely alloyed with silver that the yellow color of the metal is lost and the gold is nearly white. A large part of the product is not over 0.400 fine. The district is situated in the southwestern portion of Pima County and is bounded southerly by the border line of Sonora, Mexico, into which State the gold-producing formations extend. It is more than 10 miles square, and consequently the district has an area of more than 100 square miles. All of this territory is gold bearing. It has long been known for its white-gold placers and has been considerably prospected, but there has not been any serious or extensive development work. It is said that Mr. W. C. Kempton, mining engineer, who visited the district, remarked that, considering the extent and highly mineralized surface, it has been less developed by workings below the surface than any other mining section in the country. The district is accessible from Tucson by a triweekly stage. The roads are generally good. The rock formations are generally granite and porphyry, with argillacean slates. These formations seem to be everywhere gold bearing. In almost every ravine or gulch gold can be found by panning, and even on the hillsides and on the surface generally, especially where the soil is reddened by decomposed pyrite, gold can be obtained by dry washing. Most of the placer mining is carried on by Mexicans in a crude and desultory way, often with a small and wholly inadequate water supply, and in certain places by dry-washing machines worked by hand. The returns are small, but the miners manage to get their living, especially when they can get water. Not only gold, but silver, lead, copper, and iron ores are found in different portions. Gold is, however, the most generally diffused metal, but follows chiefly a broad belt or line through the district. The chief gold mines are found along this belt. The chief mines or claims are known as the Oro, Nil Desperandum, Sorrel Top, Tres Amigos, Holden, Gold Bug, McClenahan, Esperanza, Rob Roy, Golden Eagle, with many other locations and prospects, on several of which work is now being prosecuted.

Another part of the district seems to carry silver as the metal of dominating value, although more or less gold is associated with it. Owing to the depressed value of this once precious metal, less attention is now given to the silver-bearing portion of the district than formerly, and most of the claims are not worked.

Argentiferous lead ores are found also, but at present prices of lead and of silver the deposits are not explored. Copper ores are also found. A locality near the Jalisco range of mountains was worked for this metal with its associated gold and silver some years ago. Some lots of ore assaying as high as 37 per cent of copper and 18 ounces in silver have recently been taken out.

It is not possible to obtain definite and exact figures of the previous metal product of this section, but the foregoing list of the principal mines and prospects is believed to include those from which bullion or concentrates in larger or smaller amounts have been shipped during the past year.

Several mills have been erected in this district, but there is not anywhere a shaft or mine 300 feet deep. The Montana is probably the mine upon which most work has been done since its location, in depth and by drifts, crosscuts, and tunnels. The ore carries gold, zinc, and some copper. Since the death of its principal owner, Mr. Disston, of Philadelphia, the mine and mill have not been worked.

In the opinion of Dr. A. H. Noon, one of the old residents of this district, to whom I am indebted for most of the foregoing information, the Oro Blanco section of the mining district of the Territory constitutes a rich and inviting field which is now receiving increased attention. The Old Glory mine has been worked intermittently with variable results. In the month of February, 1898, it was reported that work on the Old Glory still continues and daily demonstrates that the property is a paying one under capable management. The mine contains large bodies of low-grade ore, but none so low that a profit can not be made if judiciously handled. This is evidenced by the results obtained by Mr. Gould.

It was also reported that the Tres Amigos property continues to be worked for development purposes, some very high-grade gold ore being found in the progress of the work. This is sorted and shipped, the last shipment yielding a return at the rate of over $500 per ton (1898).

A complete set of samples from this claim was assayed at the Arizona School of Mines and gave encouraging results.

THE DEL PASCO.

The Del Pasco, in the Bradshaw Mountains, according to Eiler's, is a contact vein, its footwall being a light drab colored porphyry and its hanging wall a greenstone slate. It strikes northeast and southwest and dips southeast. In October, 1870, there was an open cut about 150 yards in length and ore taken out to a depth of from 8 to 15 feet. The deepest shaft was only 30 feet deep. The vein in these openings had a width of from 18 inches to 24 inches. The ore at that time was worked in arrastres. The first lot of 6½ tons worked yielded 112 ounces of gold, worth $17 per ounce. The original location was 1,000 feet long. There are several smaller parallel veins. The ores carry arsenical pyrites and galena, which at the outcrops have so far decomposed as to liberate the gold and render its extraction in arrastres or mills possible.

GOLD IN THE DRAGOON MOUNTAINS.

The granitic rocks of the Dragoons on the west side of the South Pass leading from Tombstone over into Sulphur Springs Valley are gold bearing. These granitic rocks are traversed by gold-bearing quartz veins. From some of them ore has been shipped away to advantage, but no milling has been done on the ground. Dr. Rider and others have worked these veins for a long time. Scarcity of water renders the working difficult. Water is obtained in wells at the cattle ranches at the entrance of the pass on the west and in the granite formation not far from the summit.

SOUTHERN BELLE.

An extensive quartz ledge in the Old Hat mining district lies upon the northeast slope of the Santa Catalina Mountains. There are many locations upon the lode, some of which are patented. It has the form of a blanket ledge lying quite flat, dipping only about 7° to 10°. It comes to the surface along a deep canyon, which has cut down into the rocks and reveals an extensive formation of red sandstone and quartzite, probably of Cambrian age. The ledge varies from 18 inches to 5 and even 10 feet in thickness, and has been extensively worked. The quartz has been crushed in a 10-stamp mill at the canyon. It is difficult to ascertain the yield, as no reports have been made public. The gold is free and is caught

upon plates and in the battery. A considerable part of this quartz has been taken out, but there are doubtless considerable portions of the vein remaining. It is well situated for working. Scarcity of water is the chief embarrassment. This gold ledge is particularly interesting as it traverses, nearly parallel with the bedding, an extensively developed formation of red sandstone and red shale which underlies a horizon of Devonian beds, where I obtained corals and other fossils. The lode is apparently near to and parallel with the contact of a heavy intrusive dike of dioritic rock below. A series of claims, some of them overlapping the Southern Belle locations, gave me good results by panning and assay. The gold-bearing quartz is here associated with Wolframite and the veins are now being exploited for this mineral (vide Wolframite).

SILVER VALLEY GOLD AND SILVER MINING COMPANY.

This property, about 40 miles south of Kingman, in the Hualapai Mountains, Mohave County, has two or more gold-bearing veins, the quartz from which is worked in the company's 15-stamp mill.

MOHAVE COUNTY MINES.

There are many gold-mining enterprises in Mohave County, about which little is known. The gold placers of the Chemehueris Mountains have long been worked by the dry washing methods. Banks of auriferous gravel are found along the Colorado River north of White Hills. The White Hills mines were discovered in 1892, and a large amount of money has been expended in their development. There have also been extensive mining operations at Chloride and at Cubab and Todds Basin. Important discoveries of copper ore are reported from the region of Mineral Park, and ledges of the gem called "chalchuite" by the Aztecs have been located. This is known to us as the turquoise, and these localities appear to have been worked by the aboriginal races long ago. Further information will be found in the portion of this report devoted to building and ornamental stones and under the head of minerals of Arizona. The silver and lead and copper mines are also separately noticed under the appropriate headings.

SHEEP TRAIL.

This property in Union Pass district across the Colorado River from Kingman and near Bullshead Rapids, about 6 miles from the river west, appears to have been acquired by a corporation under the title or name of Arizona and New England Consolidated Mining Company. It has a mill and a cyanide plant.

SQUAW MINE.

I. S. Drew, of Cullens, Maricopa County, has made a location in the Harquahala Mountains under this title. It is at present in the condition of a "prospect." A shaft has been sunk 60 feet. An assay at the Arizona School of Mines on a sample sent by Mr. Drew gave over an ounce in gold.

DEL MONTE GOLD MINING COMPANY.

The American Exploration Company, of New York, during the summer of 1898 acquired the title to several gold-bearing ledges in the Ellsworth mining district in Yuma County, in the Little Harquahala Mountains, about 60 miles from Congress Junction. There are two groups of claims about 4 miles apart. Development work is in progress. Samples sent to the Arizona School of Mines for assay have given satisfactory results. In the Del Monte Group proper there are nine claims, each 500 feet by 1,500 feet, known as the Tiger, Ben Butler, Midnight, Morning Star, Little Willie, Aspen, Evening Star, Wedge, and the Triangle. From reports made on these claims, under date of January, 1899, the following data have been compiled:

Tiger claim.—Three veins traversing it. The chief vein extends easterly and westerly and is considered as the mother lode of the district. It is 10 feet thick, and the croppings rise in places from 8 to 12 above the surface. There are two shafts sunk to a depth of 100 feet and 300 feet apart. The western, or main shaft, has two drifts on the vein at the bottom, one extending easterly 28 feet and the other westerly 33 feet. The ore averages about $8 by assay. One sample of 10 feet of ore averaged $9.80 in value in gold and gave value of $6 in free gold. There are heavy sulphides present which can be saved by concentration, while the

free gold, it is expected, will be readily taken out on plates. One of the walls is a soft porphyry.

Ben Butler.—Opened by a shaft 84 feet deep on a vein averaging 3½ feet. The ore has given a value of $8.58 per ton by assay.

Midnight.—Opened by a shaft 22 feet deep on a 3-foot ledge, which is in places 12 feet thick and yields by assay from $8 to $12 per ton.

Morning Star.—Shaft 36 feet deep. Ledge reaches a width of over 8 feet. Assays have shown $15 in value per ton.

Little Willie.—Shaft 72 feet deep on a ledge about 3½ feet wide. Average by assay $10.

Aspen.—Shaft 33 feet deep. Ledge, 3 feet wide, averages by assay $10 value per ton.

Evening Star.—Traversed by a 4-foot ledge, which averages in value from $9 to $15 per ton by assay.

Wedge and Triangle.—These two claims are also located to cover good veins.

A large sample made up of samples from all these claims averaged $6 per ton in value. Water can be obtained from wells 2½ miles distant, and will have to be pumped to a mill. The ore is comparatively free milling.

Gold Rock.—Among the several mining enterprises attracting attention at Yuma in 1898–1899, the Gold Rock merits mention. It was closed down with an indebtedness of upward of $200,000, but it has been revived and the debt has nearly been paid off. There are three claims, known as the Queen, the Crown, and the Cross, about 30 miles west of Yuma.

Moreno (now *Guadaloupe*).—After lying idle and neglected for several years, work was resumed upon this property in 1898, and the ore was being worked in the Ingersoll mill at Tysons Well.

FREE GOLD DISTRICT, COLORADO RIVER.

To the gold-bearing region along and near to the Colorado River, in Yuma County, north of Silver District and of the old Clip mine, it is proposed to give the name "Free-Gold District" from the fact that an abundance of free gold is found there on and near the surface. This district is from 2 to 3 miles wide and 5 miles long. One end is about 4 miles from the Colorado River. The old Yuma road passes near it. It is east of the old Celestine arrastres. The rocks, according to Mr. Sparks, are granitic, porphyritic, and volcanic. These rocks are traversed by quartz veins. There is no development yet beyond a depth of 150 feet. One claim, the Golden Chimes, has a vein, according to R. W. Sparks, who has prospected there, from 4 to 8 feet wide, with some 50 tons out on the dump, which is expected to average from $35 to $40 per ton.

OTHER MINES AND PROSPECTS NEAR YUMA.

The discovery by Gleason and the important developments following greatly stimulated prospecting in the mountains north and south of Yuma and eastwardly from the Colorado. The field is a rich and promising one. The great drawback is the absence of water, or its extreme scarcity. The existence of very fine gold-bearing rock up and down the Colorado River has long been known, and early excited the attention of prospectors. Much search has been made for the lead supposed to exist called the "Lost Squaw Mine," from which it is said large nuggets of gold were brought in by an Indian squaw, who refused to disclose the locality and who suddenly disappeared without leaving any clew to the place where she obtained the gold.

COMMONWEALTH MINING COMPANY.

Pearce mine.—During the year 1896 this newly developed mine became a large producer. It is another example of the great amount of mineral wealth lying dormant in Arizona, awaiting the prospector and the aid of capital. The croppings have been known for years, but being in one of the "lost mountains" of volcanic rock in the Sulphur Spring Valley, they were despised and neglected, although some hand samples were taken, and without any satisfactory results. This is also an example of the fact that samples may be taken from some parts of even a rich lode and not yield anything by assay. Many assays and tests are required to properly ascertain the nature of a mineral lode. The mine is about 17 miles east of South Cochise Station on the Southern Pacific Railroad. It was bonded in 1895 and was worked until May, 1896, the ore taken out remaining on the dump. It was then purchased by the bondholders at about $275,000 and shipments of the ore began. The shaft is now about 400 feet deep, and makes a most

satisfactory showing of the vein to that depth. Drifts have been run each way from the shaft, and the ore is raised to the surface by steam hoists.

The ore in 1896 was shipped in bulk from Cochise station to Pueblo at the rate of from 4 to 10 carloads per day. The freight rate to Pueblo is $11.75 per ton. It is stated that the ore so shipped carries from 1 to 2 ounces in gold and from 50 to 75 ounces in silver. A great part of the ore, however, is of much higher grade, and in the comparatively short time during which the mine has been worked it has yielded large fortunes to its owners. Jenish mills were at first used; subsequently a ten-stamp mill. In June of the current year it was announced that a larger engine and thirty stamps were to be added to the mill and that the working shaft would be enlarged to three compartments.

A large part of the production is now milled upon the ground, and only the higher grades of ore are sent to the smelters.

LYNX CREEK MINES.

There is great activity in gold mining around the head of Lynx Creek, in Yavapai County, and a large tonnage of ore is being treated and shipped daily. No part of Arizona is so strongly mineralized within an equal area as is the neighborhood of upper Lynx Creek. This locality, within a radius of a few miles, has more than twenty rich veins and paying properties, which development is proving to be permanent.

WEAVER DISTRICT.

In the neighborhood of Rich Hill and Stanton, Yavapai County, and between these localities and the Hassayampa River, there are many valuable gold prospects, and a great deal of development work is being carried on. All of the veins run high in gold from the grass roots, and it is confidently expected that a large number of permanently producing gold mines will soon be in operation in this district. The neighborhood has been famous for its rich placer mines for many years.

COPPER.

PRODUCTION OF COPPER IN ARIZONA.

The fame of Arizona as a copper producer extends throughout the world. The ores of this most important metal in their varied forms are extensively distributed throughout the Territory. The chief and best-known centers of production are Bisbee, in the southern portion of Cochise County; Jerome, in Yavapai County; Morenci and Clifton, in Graham; and Globe, in Pinal County. Large quantities have also been produced in Pima County, near Tucson, and in the Santa Ritas, near Rosemont. In the early days of the Territory, even before the construction of the railways, quantities of copper were produced at the Longfellow mines and sent out by ox teams overland. In these early days, also, the mines of the Ajo Mountains produced and shipped large amounts of native copper, and the scarcely less rich and valuable red oxide, to San Francisco by way of Yuma and the Gulf.

It would be a great and almost impossible task to enumerate, and much more difficult to describe, all the localities of copper ores in Arizona. Many of great promise are yet lying idle, waiting for the hand of capital to develop them. Many are yet to be discovered, for the work of the prospector in Arizona is not yet completed.

The year 1898 was a busy and profitable one generally for our chief copper producers. The production was not only well sustained, but it exceeded the records of former years. Great advancements and improvements in the art of reducing the ores were made, by which not only the cost of treatment was reduced, but by which ores of a lower percentage were profitably treated, while at the same time a superior product can be turned out, costing less for transportation. The well-known Williams Brothers, at Bisbee, and the managers at Jerome and at Clifton have, in their respective fields, been in the vanguard of progress, and have not allowed the reputation of Arizona for alert, progressive intelligence to suffer nor to be diminished.

The rapid rise in the price of copper has stimulated the investment of capital in the many neglected copper-mine prospects of the Territory. Many of them which had fallen into neglect have been reopened and developed into producing properties. Prospecting has also been stimulated and new veins and deposits of copper ore have been located and sold under working bonds. The older and largely producing properties have been pressed to greater activity and increased output, so that the copper production of Arizona for the year 1898-99 is the

largest in its history, being 110,823,864 pounds against 81,019,222 pounds for the year 1897 as shown by the annexed table:

Production of copper in Arizona.

	Pounds.		Pounds.
1883	23,874,965	1891	39,873,279
1884	26,734,345	1892	38,436,079
1885	22,706,366	1893	43,902,824
1886	15,657,035	1894	44,531,108
1887	17,720,462	1895	48,329,403
1888	31,797,300	1896	73,745,321
1889	31,586,185	1897	81,019,922
1890	34,796,689	1898	110,823,864

The production for the first six months of 1898, or from January to June, inclusive, was 49,503,294 pounds, and for the first six months of 1899 it amounted to 63,847,198 pounds. The Engineering and Mining Journal says: "Arizona, which was last year the third State in the amount of its production, showed a gain of 19,820,942 pounds, or 24 per cent, the greater part of which came from its two great mines, the United Verde and the Copper Queen, although some of the smaller producers, such as the Arizona Copper Company at Graham, showed large advances."

The total copper production of the United States for the first six months of the year, ending June 30, 1898, amounted to 269,680,880 pounds of fine copper, and for the entire year to 535,900,232 pounds of fine copper, including 7,015,875 pounds in copper sulphates, an increase over the year 1897 of 6.8 per cent.

While there is a considerable export from Bisbee of copper in the form of rich copper matte through Nogales into Sonora, Mexico, there is also a large importation of the metal through the same channel. In the month of March, 1898, the importations at Nogales were the largest in the history of the custom-house, amounting to 7,685,874 pounds, valued at $551,984. The official figures for the year 1898 are not satisfactory.

THE UNITED VERDE COPPER MINES.

The United Verde copper mines, situated at Jerome, 28 miles from Prescott, in Yavapai County, and owned by Senator W. A. Clark, of Montana, have a world-wide reputation. Their production in both copper and gold has been phenomenal. While it is not the policy of the company to furnish detailed information for publication, enough is known to justify the statement that the yield in copper bullion of these mines per month is approximately 3,000,000 pounds. Some months the yield exceeds this amount. The bullion contains considerable gold and some silver. The ore bodies in the mines are of great extent and value, and can not be exhausted in a lifetime. The mines and reduction works of the United Verde Copper Company are at present employing about 1,000 men. The principal shaft is about 600 feet deep. From different levels tunnels have been driven, and the underground workings are extensive. The engine capacity of the plant amounts to 2,000 horsepower, which is utilized in hoisting ore, operating air drills, copper converters, machine shops, and a 40-ton crane. A vast amount of new ironwork has been put in, consisting of structural works for buildings covering the entire plant, engine and boiler rooms, converters, blast furnaces, machine shops and foundry. The plant in some respects is the most complete in the country, and the converters in use there are said to be the largest in the world. A reverberatory furnace is used in smelting the finer ores, especially those rich in silver. A greater part of the ore when taken from the mines is first roasted in heaps, extending along the slope of the mountain in three long rows, whereby it is desulphurized. It then goes to the blast furnaces and finally to the converters. The copper bullion which is thus produced is about 99 per cent pure copper. The mines, smelting plant, and town of Jerome are situated on the east slope of the Black Hills range, pretty well up toward the crest, at an altitude of about 5,600 feet above the sea level, and at least 1,800 feet above the Rio Verde Valley, which spreads out in grand panorama to the east and south. The town contains about 4,000 people. A considerable amount of prospecting is going on in the adjacent territory, and mining is active in that vicinity. The equipment of these mines is thorough and complete in every way, and the property is conceded to be one of the greatest and most valuable in the known world.

BISBEE—WORKS OF COPPER QUEEN COMPANY.

CLIFTON PLANT OF ARIZONA COPPER COMPANY, LIMITED.

BISBEE.

The production of high-grade 99 per cent black copper at Bisbee has been during 1898 the largest in its history. It is said to average two carloads a day. Besides shipping ingots of black copper, there is a considerable output of a rich copper matte, which is sent to Mexico to supply another company with a desirable form of flux. It contains about 45 per cent of copper, and is sent at the rate of about a carload a day to Agua Caliente, Sonora, Mexico, by way of Nogales.

In 1896 the company was running four blast furnaces and smelting about 400 tons daily in each twenty-four hours. The product was copper matte, which was bessemerized, or treated by the pneumatic method in three stands of trough converters, giving a product of ingot copper averaging 99.3 per cent of fine copper. The production for the fiscal year ending June 30, 1896, was 10,492$\frac{1}{1000}$ tons, or 20,984,510 pounds, of bessemer pig copper, averaging 99.2 per cent fine copper. The introduction of the pneumatic process, with its special American modifications, in Montana and in Arizona, at Bisbee and Jerome, has revolutionized the art of copper smelting, and has made our text-books on the subject chiefly valuable as histories of the metallurgy of copper. The production for 1899 has been maintained at a high figure, and the town of Bisbee has been exceptionally prosperous.

Bisbee is fortunate in more than one respect. It is situated near the head of a canyon, on almost the extreme south edge of Cochise County, about 6 miles from the Mexican line. It is owned by the Copper Queen Company, and is generally understood to be one of the many copper camps controlled by Phelps, Dodge & Co., of New York. It is reached by its own railroad, which connects with the Southern Pacific at Benson, about 35 or 40 miles northwest. It is said that there are 1,000 men on the pay roll of the company. The wages paid are $3 above and $3.50 below ground, and fortunate indeed is the man whose name is on the roll of the favored thousand. The output of the camp is said to be three carloads of refined copper per day. The town is scattered up and down the canyon for at least a mile; but the town proper is centered immediately east and south of the big smelting plant. The business of the town is carried on largely in the canyon, where the stores, saloons, restaurants, and lodging houses are principally located. On the steep face of the mountain south of the canyon is to be found the principal residence portion. The main canyon is intersected by another a short distance below and almost immediately opposite the smelters, and is known as Brewery Gulch. As this gulch afforded a limited quantity of building space, it has been made use of, and here the small merchandising of the community is carried on. On the whole it may be summed up that the mines and reduction works of the company occupy the north side of the canyon, the residences the south side, and the business houses the canyon proper.

At the head and front of the Copper Queen Company stand two men whose names are household words in southern Arizona, Messrs. Ben and Lewis Williams. The former is superintendent, and under his direction the Copper Queen Company's plant and mines at Bisbee have passed into history as one of the most successful copper-producing works in the country. Independent of the great value of the mines, there are not less than $1,000,000 or $1,500,000 involved in the great plant itself and incident thereto. Mr. Lewis Williams, or as he is better known among the little army of employees, "Don Lewis," is second in command, and in the absence of Mr. Ben Williams is superintendent in charge; but at all times the smelting plant is under his immediate supervision. Than these gentlemen there are not two more popular employers of labor in the whole country. Their fair and courteous treatment of the men and the kindly interest in the welfare of their employees have endeared them to all.

THE CLIFTON COPPER DISTRICT.

The mines of this district have so frequently been referred to that it is unnecessary to repeat much that has already been said about them. Few people, however, are aware of the immense amount of development work done in this field during the last few years. The principal companies engaged in business are the Arizona Copper Company, Limited, of Clifton, and the Detroit Copper Mining Company of Morenci. The former company draws its ore supplies from various groups of mines, situated from 5,000 to 7,000 feet above sea level. The most important of them—the Longfellow group—which is situated in the heart of the Morenci field, side by side with the mines of the Detroit Mining Company, has been a producer since 1872. Up till a few years ago practically all of the ores were taken from the contacts between magnesian limestone and the porphyry. These ores were oxidized

and self-fluxing, and a single smelter was all that was necessary to produce copper bullion 98 per cent fine. The mineralized limestone belt extended fully a mile in length. The ore bodies, however, were largely superficial in their occurrence, and were never found in quantity at a greater depth than 300 feet below the surface, the average depth of pay ore being 150 feet. The ores, in the main, had been formed by the replacement of limestone by solutions of copper. It was not to be expected that this field would last forever. As early as 1891 the mines situated in the limestone field began to give evidence of exhaustion. Extensive exploration by the diamond drill was only successful in exposing and throwing more light on the mineral formation. Exploration for new ore bodies in this direction being unsuccessful, attention was turned to the extensive porphyry belt against which the limestone and lime shales abut.

On the surface of the porphyry belt there were practically no indications of copper. There was, therefore, nothing definite to follow from the surface. Under the circumstances it was deemed advisable to puncture the Humboldt Mountain with a tunnel which would cut under the apex of the mountain at a depth of fully 400 feet. This work, conducted with judgment, was successful in exposing enormous bodies of low-grade sulphide ores, which, however, were so low in grade that for a time it was doubtful if they could be treated with profit. An enormous amount of capital had been sunk in the development of the ore bodies and further large outlays had to be made on concentrating plants and on other plants necessary for the treatment of these ores. The problem was attacked with vigor and skill, complete success attending every effort. These results practically amounted to the transformation of one of the oldest copper companies in the Territory into one of the youngest, for it laid open to it a virgin field which has already proved to be much more extensive and much more enduring in its character than the original limestone belt on which the company formerly depended. In addition to the Longfellow group, the company has also groups of mines known as Queen, Coronado, and Metcalf groups. Of these, the latter, so far, has been the most important. It has produced largely of a low-grade oxidized ore found on the surface of the Metcalf Hill. This ore, while extremely low in grade, occurs in great quantity. For its successful treatment concentration and leaching have both been found necessary.

The Coronado group, on account of its distance from the works at Clifton, and also on account of the difficult and expensive transportation, has heretofore been given but little attention. It is, however, a property of great extent and of great possibilities.

The metallurgical plant is one of the largest in the Territory, and consists of smelting furnaces with a capacity of 500 tons per day, concentrating plants with a capacity of 750 tons per day, a leaching plant with a capacity of 150 tons per day, a two-converter Bessemer plant, operated entirely by gas-engine power; a sulphuric acid plant and a bluestone plant. In addition to the Bessemer plant three of its concentrating plants are operated by gas-engine power. The gas engines employed have a rated capacity of 750 horsepower, and have been found to be extremely economical in fuel. The company is now producing copper at the rate of 10,000 tons per annum. It employs about 1,500 men on its mines, railways, and works.

In connection with the works there is an insurance society in successful operation. This society is officered and managed by the employees of the company, and the monthly charge for this insurance society amounts to only 50 cents, and for every dollar subscribed by the employees the company contributes 25 cents. This extremely low charge has been found to be more than equal to meet all claims made upon the society through accidents, and also through the hospital, which is also maintained by the society. The camp of Clifton is one of the healthiest in the Territory, and a more prosperous or more contented body of workmen can not be found anywhere.

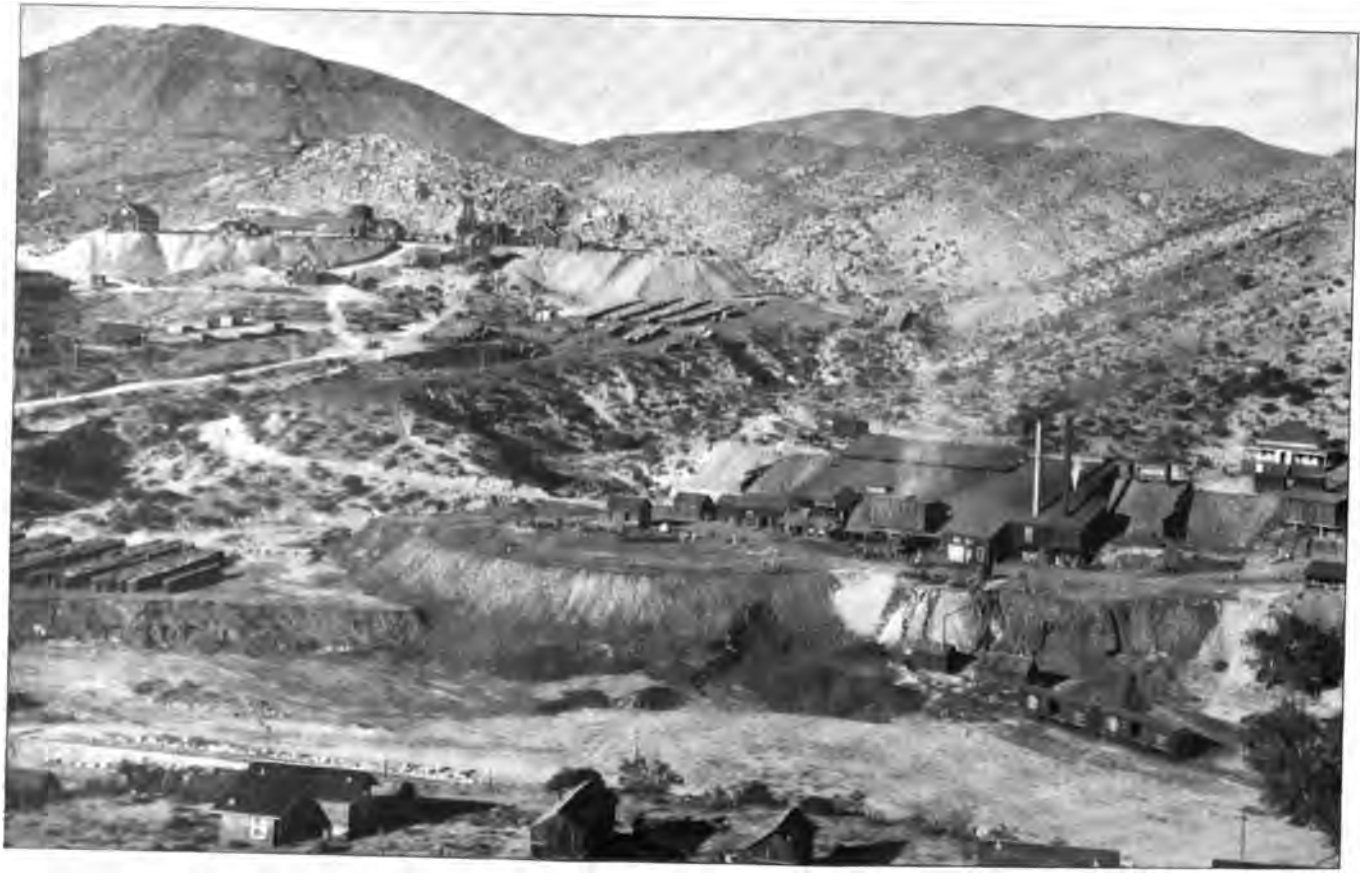
In addition to the society the employees have also a magnificent reading room, equipped with baths and built so as to be suited for meetings, entertainments, and dances.

Situated at an elevation of 3,500 feet above sea level, Clifton enjoys a climate which is a happy medium between the extreme heat of the southern parts of the Territory and the more invigorating climate of the North.

The Detroit Copper Company at Morenci, the property of Phelps, Dodge & Co., produces 7,500 tons of copper per annum and employs 1,000 men. This company is about to build a narrow-gauge (3-foot) railroad from Morenci to Guthrie, a distance of 18 miles. The company is also erecting a 100-ton concentrating plant, and is making many improvements, all of a substantial order.

BISBEE—RESIDENCE PORTION OF TOWN.

UNIV. OF MICH.



COPPER REDUCTION WORKS, GLOBE.

GLOBE COPPER DISTRICT.

Globe district is situated on the northwestern slope of the Pinal Mountains, about 28 miles from the famous Silver King Mine. In the period from 1876 to 1883 this district attracted much attention by reason of the many discoveries of rich silver veins. At present mining activity is confined chiefly to copper. The completion of the Gila Valley, Globe and Northern Railway, a branch of the Southern Pacific, now gives access to the region and has greatly stimulated its development. The first location on what is now considered the main copper-bearing belt was made in 1875 by the locators of the Silver King Mine, and it was named the "Globe." This location is now held and worked by the Old Dominion Copper Company, which also has two other locations on the same vein—the "Southwest Globe" and the "Globe Ledge." The vein is described as following a contact, having for a foot wall diorite and for the hanging wall limestone containing fossils of the carboniferous period. On the west side of the outcrop there is a capping of a volcanic rock, referred to as trachyte, which conceals outcrops in that direction. That good ore occurs there was shown by Dr. Trippel by a drift west from the shaft, and openings were afterwards made through the bed of trachyte and have been extended downward on ore for over 300 feet. This deposit was regarded by Dr. Wendt as a fissure vein, and he notes that in approaching the ore body through the long adit tunnel running lengthwise of the claims the conditions are similar to those observed in the Longfellow mines at Clifton and the Queen and Prince mines at Bisbee, especially as regards the decomposition and kaolinization of the rock.

The ores are mostly oxidized, but large bodies of sulphides have been found on the second and third levels, with oxidized ores below them. They carry a large amount of silica and frequently require heavy additions of lime and iron to the charges.

The Old Dominion Company put up two 100-ton smelting furnaces. The production of black copper from November 1, 1895, to August 1, 1896, was reported as 6,940,000 pounds.

THE UNITED GLOBE MINES.

The mines have the "Hoosier Ground," consisting of some eighteen locations on the main lode, including the Hoosier, Centralia, Gladiator, Transit, Nevada. The Buffalo group includes the Buffalo, Cleveland, and Mark Twain. In these mines we find practically the same conditions as in those of the Old Dominion claims. The vein, however, changes its trend somewhat, lesser in its angle of dip, and is not so wide. The limestone also becomes more magnesian. Sulphide ore in bodies has not yet been found, and the ore is a little more siliceous than those described. Samples taken from the veins for a week gave the following for the average composition for the principal substances:

	Per cent.
Copper	14.6
Iron	19.3
Silica	29.4
Lime	13.1
Magnesia	4.2

The present output of the group, derived from two water jackets, is on an average 3,000 pounds of black copper daily and of excellent quality, assaying usually as follows:

	Per cent.
Copper	97.60
Silver	.52
Gold	Trace.
Iron	1.01
Sulphur	Trace.

Since the report for 1898 there has been a change of ownership and a reorganization of the company, under the same control and largely the same ownership as the mine at Bisbee. According to an extended description of the camp in the "Silver Belt," the United Globe mines were organized as a company for the mining and smelting of copper in 1892.

The property of the company comprises some thirty mining claims on the Globe copper belt, north of the town of Globe; a smelting plant and other surface works, and a sawmill on Pinal Mountain. None of the claims, except the Buffalo and the Hoosier, perhaps, were anything more than favorable prospects when purchased by the company, and the smelter was a crude affair of one small water-jacket furnace.

In August, 1895, the work of remodeling and enlarging the plant began and has progressed steadily since. In this work of improvement the superintendent has had many obstacles to contend against, chief of which was difficulty in getting the necessary lumber and the slow transportation of machinery and other supplies. Happily, these annoyances are now about at an end, and the visitor to the United Globe will see one of the most complete and substantial plants for the handling and smelting of copper ores in Arizona.

The smelter has been practically rebuilt, and the smelter building and tramway terminal cover an area of 189 feet square. The buildings are spacious, thorough in construction and planned for convenience and facility in handling the ores, coke, copper, etc. The principal furnace is a 126 by 38 inch elliptical water jacket of the Douglas patent, built by the Samuel L. Moore & Sons Company, of Elizabeth, N. J. The new feature (the invention of Prof. James Douglas) is the leading of the blast, through the water compartment before entering the furnace, causing the heating of the blast, with a corresponding cooling of the water and a more even temperature around the crucible. The theoretical capacity of the new furnace is 125 tons per day, but the actual capacity, smelting the oxide ores of the district, will likely be from 150 to 175 tons. A 36-inch jacket of the ordinary pattern will also be employed. The most important addition to the plant is the tramway of the improved Bleichert pattern, built by the Trenton Iron Works, New Jersey. The line runs from the Buffalo ore bins to the smelter, a distance of 8,000 feet. Ore from the Hoosier shaft will be hauled 1,500 feet in cars, drawn by mules, to the Buffalo ore bins and there transferred to the cable tramway.

At the mines the principal development work is directed toward the openings of the Hoosier claim and adjacent territory between it and the Dime, in Copper Canyon. For this purpose there has lately been erected a small hoisting plant on the Hoosier shaft, together with the main blacksmith and carpenter shops, a storehouse, and office for the mine foreman. Underground work has just been initiated to crosscut from the main foot wall into the limestone, where it is supposed that the main ore bodies will be encountered.

An important strike of rich ore in a considerable body was reported in this mine in April, 1897. The several mines were then supplying more ore than could be smelted in the 30-inch jacket then in operation.

The work in other portions of the Hoosier territory for several months past has consisted of making thoroughfares and openings for necessary ventilation, and generally to connect the principal claims of the Hoosier group with the main outlet at the Hoosier shaft. Little or no work has been done for several months in the Buffalo mine

The old road to the big Johnnie claim has been repaired and a new portion constructed leading to the Buffalo ore bins, and over which it is proposed to utilize the traction engine which some years since did duty for the Copper Queen Company in hauling ore from the White Tail Deer mine to Bisbee.

The Big Johnnie, Birdsnest, and Buckeye claims will furnish some ore to the smelting works, and their products will be hauled by this engine.

The outlaying claims are connected by telephone with the mine foreman's office and the smelter.

A dynamo will shortly be added to the smelting plant for lighting it and the company's buildings near the works.

In January, 1897, at the United Globe, work on the upper terminal of the cable tramway was completed. At the smelter the ore and rock bins under the crushers are being constructed and many lesser details looked after. The stacks have been erected over the furnace, the floor laid in the engine and blower room, and the smelter practically completed and ready to begin the production of copper, and it is expected that one 36-inch jacket will be blown in about February 1 or soon thereafter. Progress is reported in mine work. The Hoosier shaft is down about 280 feet and sinking proceeds uninterruptedly.

The commissioner of Gila County reported in 1898 that the Globe mines had produced 70,000,000 pounds of ingot copper, and that the owners of the Copper Queen at Bisbee have, in Globe district, about thirty-five contiguous claims.

PINTO CREEK MINES.

He also reports a promising mineral country on Pinto Creek, north of Webster Gulch, which is known to be rich in gold, copper, and lead. It is 16 miles west from Globe. Several companies have been organized to work some of the claims; amongst these are the Pinto Creek Mining and Smelting Company, the Kasser Gold Company, and the Black Warrior, in Webster Gulch. The Continental mines are 14 miles west from Globe.

GLOBE—LOOKING SOUTH.

BLACK WARRIOR COPPER COMPANY.

The company has fourteen full claims situated about 6¼ miles westerly from Globe, Ariz., being more particularly described as being on Webster Gulch, 1 mile above the junction of Webster and Lost gulches.

During the summer of 1898 the Black Warrior Company was working, under bond, the Diamond H. group of claims, consisting of twelve, situated at the head of Lost Gulch, one-half mile above the Kasser Gold Mining and Milling Company's stamp mill. Work on the Diamond H. group has developed in the 135-foot shaft a body of sulphide of copper and sulphide of iron ore carrying 20 per cent copper. The district is short on sulphide ores, and the Diamond H. group, under the management of the Black Warrior Company, promises to supply the smelters with sulphide ore. The ore found so far will concentrate about 8 tons into of concentrates, and as the work progresses the sulphides are getting stronger and the mine promises soon to turn out sorting sulphide ore. The vein is a contact, the lime and permanent contact vein, with porphyry as a foot wall and the lime as a hanging wall. This contact runs straight from Lost Gulch on the Diamond H. mines to Pinal Creek.

The Black Warrior Company's copper properties proper have produced from their Webster Gulch claims 2,000 tons of ore, and shipped the same to the United Globe smelter, at a profit of $10 to $15 per ton on ores running from 10 to 22 per cent.

Montgomery.—The Montgomery claim, the one on which the most development work has been done, has a 300-foot shaft, 250 feet of which is in 10 per cent copper ore; a 350-foot tunnel, 240 feet in 10 per cent ore, and a body of copper ore has been opened for several hundred feet, running from 10 to 20 per cent, from which shipments of 700 tons have been made.

Dadeville.—The Dadeville claim, abutting on the east end of the Montgomery, has two 100-foot shafts connected by a drift or vein. In the east shaft on Dadeville there is opened up a 6-foot body of ore oxide of copper, running 24 per cent copper. Work is now being done getting ready to block out the ore preparatory to reduction. The ore is taken out for $1.50 per ton, as the mine is practically a large quarry; one open cut is 20 feet wide and 20 feet high, 150 feet long, all in ore, sides, top, and bottom. To further extract ore, all that is necessary is to go down the hill a few feet and start another bench, quarrying the ore out and, after sorting, dumping into cars and haul it by a horse on a 30-inch track and cars to the ore chute at east end of Dadeville claim.

The company is now working on a 200-foot tunnel, to tap the bottom of the three main shafts, thereby doing away with hoisting of the ores. All ores will be taken out through this tunnel and dumped into ore chutes ready for loading and shipping to Globe. The haul to Globe is an easy grade downhill. One team of four animals can haul easily 4 tons of ore per day.

The Black Warrior Company will make careful study as to what kind of a plant is necessary for the treatment of the ores, and until such time as it sees fit to build a plant will take advantage of the smelting rates at Globe. (From data furnished early in 1899.)

Since the above was reported the company has erected a smelting and leaching plant and all the buildings necessary to a well-equipped mining camp with perfect appointments, and it is expected that the product in copper will be large before the close of the year 1899. The plant includes a tramway 6,000 feet long, which carries the ore to the reduction works. These works include an acid-leaching plant which has a daily capacity of 300 tons.

Continental Copper.—This copper property, situated 11 miles west of Globe and formerly owned and controlled by N. L. Amster, was purchased by the Old Dominion Company in July, 1899.

COST OF COPPER AT GLOBE.

The following figures, obtained from the late Dr. Alexander Trippel, regarding the cost of producing copper at Globe, are interesting. For many years the average of the copper ores of Globe was from 14 to 15 per cent of copper, and at that percentage the metal cost 5 cents a pound to produce. This sum included all the expenses, including the management, administration, etc. For a period of about one year the best ore averaged from 17 to 19 per cent monthly. Coke cost $52 per ton at the smelter, and the 98¼ per cent black copper cost 4.3 cents per pound. It is to be noted that the conditions since that time have essentially changed. It was then not accessible by rail, but now coke can be delivered at Globe for much less than by teams.

TWIN BUTTES, MARTINIQUE.

This group of copper-bearing claims includes: Senator Morgan, Gladstone, Copper Monument, Copper King, Copper Queen, Copper Glance, Copper Bullion, Copper Prince, Senator Tillman, Copper Hill, and James G. Blaine—eleven claims in all and located in three groups. These claims are in the Pima mining district, on the west side of the Santa Cruz Valley, about 25 miles southward from Tucson, and are easily accessible. The development consists of superficial openings and pits, from which a considerable amount of copper ore has been taken and shipped to the smelter, as shown by the subjoined list. These ores occur at and near the contact of plutonic injected rocks or dikes, with limestone beds of the Lower Carboniferous age.

Number of pounds and percentage of ore shipped to smelter from the Twin Buttes mines (Ellis, Wish, and Baxter, owners).

Pounds.	Per cent copper.
28,665.....	21
21,185.....	23.70
21,610.....	16,30
23,450.....	18.70
211,975.....	27.50
50,050.....	20.70
16,170.....	21.70
11,065[1] ...	10
48,610.....	19
57,310.....	15.30
41,955.....	14
11,410[1] ...	10
81,470.....	18.50
17,735.....	19
642,660.....	.....

[1] Second-class ore.

Averaging over 18 per cent copper.

During the spring of 1899 Mr. H. Ruckman, of Tucson, secured a bond on this property and disposed of it to Col. J. P. Martin, of Xenia, Ohio, who is now developing the mines, and has named the group the Martinique. The property was reported upon by the late Dr. F. M. Endlich some years since, and recently for Colonel Martin.

AZURITE COPPER AND GOLD MINING COMPANY.

The mines of this company are in the Sierritas Mountains, in the foothills 18 miles south of Tucson in Pima County, and are accessible by a fine natural road. A carriage can be driven to the mines. The company has acquired eight claims, known as the Mineral Hill group, also other claims known as the Shedd group, and has been for several months of 1899 engaged in the work of development and smelting the ores extracted from the deposits. These ores consist of the yellow sulphide of copper in depth and of the products of its oxidation at and near to the surface. These secondary ores are in large quantities and consist of green and blue copper carbonates, red oxides of copper, and the variously colored mixtures of these minerals with red oxide of iron. All occur in limestone at and near to the contact of the limestone with granitic and plutonic rock. This limestone is much altered by the contact. It is changed from blue to white. It is probably of the age of the Carboniferous. The ores are much spread through the limestone and the exact thickness and extent of the ore bodies is not yet sufficiently shown by the comparatively superficial working, consisting of many pits and open cuts and quarry-like openings. The aggregate depths of the shafts is stated at about 400 feet; length of drifts on the 100-foot level, 575 feet; on the 200-foot level, 250 feet; crosscuts on the 100-foot level, 200 feet; on the 200-foot level, 250 feet. There are two winzes of about 50 feet each. But these openings are being constantly extended and the figures do not represent the extent of the workings in June, 1899. Water has been found on the 310-foot level.

According to the statement made by the company, the mines had, prior to the purchase, been leased on a royalty on the ore extracted. Since the year 1875 over 4,000 tons of ore have been mined and shipped away to different smelters. The returns, as far as obtainable as to quantity and quality, are as follows, and

are taken from the certificates of the three smelting companies which purchased ore on their own sampling and assaying:

Year.	Quantity.	Shipped to—	Assay.
	Pounds.		*Per cent.*
1895	1,250,000	El Paso	22
1895	2,000,000	Tucson	12
1896	670,000	do	12.6
1896	761,350	Copper Queen	11.4
1897	52,370	Tucson	19.3
1897	242,767	Copper Queen	10.7
Total	4,976,487		[1] 14.6

[1] Average.

To work these mines, to secure United States patents, and smelt the ores a company was organized at Tucson, Ariz., December 18, 1897, under the laws of the Territory, with 2,500,000 shares of a par value of $1 each. Several shipments of black copper and of high-grade matte have been made. One shipment on the 25th of June, 1899, consisted of 42,900 pounds of copper bullion and matte, completing a record of over 200,000 pounds of copper bullion and matte during the last run of the 30-ton smelter at the mine.

OLIVE CAMP.

For the last ten years the Olive Camp, in the Pima mining district, located southerly 18 miles from Tucson, has been a steady producer in a greater or less degree. When silver was at a fair value many thousands of dollars were taken out in high-grade ores and shipped to the various reduction works of the country, and, as silver depreciated in value, none but the higher grades of ore were shipped, and the output naturally decreased.

More recently attention has been turned to the development and shipment of high-grade copper ores which abound in that district, as well as some lead ores, so that the district continues as a substantial producer. Recently some very promising developments have been made and copper ore shipments continue, but none but high-grade ores are shipped on account of freight rates and high smelter charges. But time will obviate this, as reduction works must soon be established in the district as the large amount of low-grade ore accumulating on the dumps will make an investment most profitable.

SAN XAVIER MINE.

This is one of the oldest and most extensively worked mines in the vicinity of Tucson. It has a history of several years and has yielded large amounts of ore from extensive bodies of a low-grade character, but easily accessible and convenient for working and shipping. It is in the foothills of the Sierritas Mountains about 20 miles south of the city, and is reached by a splendid natural road of even grade, leading to the mine about a thousand feet higher than the San Xavier Mission. It is not far from the Azurite claims, and is in the line of the extensive mineralization of the formations by contact metamorphism.

The group of claims was patented and held by parties in Boston, but after some years of idleness the property was acquired, in 1897, by Gen. L. H. Manning, who has reopened the mines and revived the working and shipping the ores to the smelting works at El Paso.

The ores as developed in depth below the horizon of oxidation are a mixture of zinc blende, galena, and copper sulphide.

The San Xavier mine was worked originally by "chloriders" some twenty years ago as a silver and lead proposition, no attention whatever being paid to the copper contained, either in the ores which they extracted and sorted, nor to other portions of the claims which show quite large percentages in copper. The property was left idle for some ten years, the mine filled up with water, and what is known as the water shaft, which is 300 feet in depth, contains very large bodies of sulphides carrying from 15 to 25 ounces of silver, 3 to 10 per cent copper, and from 15 to 40 per cent lead. All of this body of sulphides in the water shaft will also show from 20 to 25 per cent zinc. After ascertaining the values from actual shipments and finding that the zinc was not desirable by the smelters, about 50 tons of the

ore was concentrated with a view of separating the zinc from the copper, lead, and silver. These experiments were made on a Wilfley table and the result was very satisfactory.

Some of the mixed ore was also worked upon the jigs at the Arizona School of Mines and a very fair separation of the galena was effected, while at the same time there was a concentration of the other minerals by the separation of quartz and earthy matters. In general, however, the ore is concentrated by nature and does not justify effort to effect a separation of its constituents.

The sulphide bodies have been well developed, and these ores can be worked by any ordinary methods of working sulphides or by separating the zinc which is the only objectionable feature of the ore, and then ship to the smelters, or they can be shipped as mined. All of the sulphides appear to be higher in value in copper, lead, and silver than the carbonates. It is difficult to give any reliable estimates upon the number of tons of sulphides which are actually developed. There are such vast quantitities, and the openings are so irregular, that any estimate which might be made would not be reliable. Mr. Manning, in 1897, felt perfectly sure that at least 50,000 tons of material could be secured between the water shaft upon which there was one hoist, and the union shaft upon which there was also a hoist, the distance between the two being 275 feet. The minimum value of these sulphides is not less than $15 per ton. Thus, taking the low estimate on these ore bodies of 50,000 tons, we have a gross value of $750,000. In October, 1897, Mr. Manning estimated that there were exposed practically from 25,000 to 35,000 tons of the oxidized ores to a depth of 60 feet. In one place the vein or deposit was fully 50 feet in width, and several shafts had been sunk into this body to the depth of 60 feet.

The returns upon shipments of considerable quantities to the smelter show a considerable difference in the composition of the ore at different places. The ore body appears to be made up of lenticular masses lapping one over another as in segregated masses. Considerable masses of nearly clean galena are found, and again the copper sulphides appear in greater volume.

The average of the ores thus far shipped has been from 1½ to 5 per cent copper, from 2 to 15 ounces in silver, and from 10 to 30 per cent lead. The other constituents in the ore are on an average about 35 per cent silica, 12 per cent iron, and 5 per cent lime.

In October, 1897, the smelter paid for all the metallic contents of the ore. For the silver 95 per cent of the New York quotation was allowed, and for the lead 55 cents per unit, and for the dry copper 80 cents per unit. Of course, since the great advance in the value of all the metals these figures would be exceeded. In other words, the ores of the San Xavier are worth much more in 1899 than they were in 1897.

The following figures show the costs and charges upon this ore in October, 1897. It then cost $1.93 per ton to haul the ore from the mines to the railroad. The railroad rate was $2.50 per ton, and the smelter charges, based upon the lead and silver percentages, was from $4.50 to $6 per ton; the average smelter charge during the month of October was $5.50 per ton. The fixed charges were as follows:

Smelter charges	$5.50
Railroad freight	2.50
Hauling	1.93
Total fixed charges	9.93

The following figures show the extent of the extraction and shipment, the expenses and the returns upon the San Xavier in the month of October, 1897:

Thirty-four cars shipped contained 752 tons:

Total gross value of ore	$10,237.00
Total expense	8,218.00
Net profit	2,019.00
Net profit per ton	2.68

The daily average, therefore, for the month was 25 tons. The shipments for the future, it was claimed, would average in value somewhat better than those given, because some 400 tons were shipped during the month from old dumps which some years ago had been hand sorted for the silver contents, thus running some of the cars down to as low as $12.50 total valuation.

At the end of the month of June, 1899, Mr. R. W. Forbes, the superintendent, was in Tucson and stated that the mine was yielding satisfactorily and that it was the intention to ship 1,000 tons of ore a month. About 50 men were employed.

TABLE MOUNTAIN COPPER.

It is understood that there was a considerable development of copper ore at Table Mountain, beyond the San Pedro, during the year 1898. No report or description of this property has been received for 1899, but operations appear to have ceased. The coke which was ordered and delivered at Willcox was seized and sold, and it is supposed that the mine did not justify further development or the erection of the proposed smelting plant.

About 6 miles to the eastward of Mammoth, and over the pass at Table Mountain, is the property of the Table Mountain Copper Company. The company now has 50 or 60 tents pitched, and these constitute the present living and business apartments. Lumber and material are being hauled into the camp, and more comfortable and commodious quarters will soon be erected for the accommodation of the company and its employees. About 75 men are now employed in the camp. The company has expended several thousand dollars in making a first-class wagon road from their camp to a main road leading to the Southern Pacific Railroad at Willcox, and over this road all the supplies and machinery will be transported to this camp. This property is being developed by means of an open cut, and resembles a large quarry rather than the usual mine. The face of the cut has a vertical thickness of about 50 feet, and the surrounding croppings extend about 3,000 feet laterally.

SAGINAW.

Extensive developments and improvements were made during the year 1898. The installation of large pumps for raising water were made on the borders of the Santa Cruz, and water was supplied to the camp from this source. A costly mill and a smelter were erected at the mines, but the ores were too lean and base to pay a profit, and the plant was closed down and has been in the hands of the sheriff.

MOHAVE COUNTY COPPER.

Important indications or "prospects" of copper-bearing ledges are reported from Mineral Park, Mohave County. The ores appear to be the yellow sulphide and copper glance in veins traversing crystalline rocks.

COPPER ORES ALONG THE COLORADO.

The rich copper conglomerates of the vicinity of La Paz attracted great attention about the year 1865. Very rich masses of nearly pure citreous copper were taken out, but the quantity does not appear to be sufficiently large to justify working. In the vicinity of Castle Dome there are rich copper ores in small quantity which carry free gold. These appear to be more in the nature of veins than of deposits like those of La Paz and Planet. Of the copper mines of the Harcuvar Mountains no information has been obtained.

COPPER MINES OF THE AJO.

These historic mines in Maricopa County, which, in the early days of the occupation of Arizona by the whites, sent out wagonloads of native copper and red oxide, and which have largely added to the fame of the Territory as a copper producer, have been worked with more vigor in 1899. For an interesting notice of the earliest workings on these mines reference is made to the Sketch of the History of Mining in Arizona. The mines have been worked in a small way for years past, but in 1899 Col C. C. Bean has been actively engaged in reopening and in working one or more of the principal mines, and has made shipments of a high-grade ore to smelters. He finds chalcopyrite and bornite in depth and is sanguine of a successful result. Other parties in the district are mining and concentrating ore and shipping out the product by the Southern Pacific Railroad from Gila Bend station.

COPPER GLANCE.

This noted claim in the Huachuca Mountains is about 15 miles from Fairbanks by wagon to foot of the mountains and thence 11 miles by trail over the summit of the mountains to the mine. It was opened and worked for some time. Shipments of high-grade copper glance ore were made from a chute or chimney about 50 feet in length. There is a continuous vein from the summit of the range to a

depth of about 500 feet. Considerable development work has been done. The lower tunnel, about 500 feet below the summit, is 606 feet long, following the vein, which shows for the entire distance. About 2,000 feet of drifting and tunneling has been done, but does not show any increase in the size of the vein or any important reserves of ore.

HILLSIDE COPPER MINES.

A region south of the Hillside silver and gold mines, upon the Santa Maria, Yavapai County, is remarkable for the abundance of siliceous copper ore in small seams traversing the rocks. Chrysolla and some black oxide abound, to the exclusion of the usual carbonated and ferruginous ores.

AMAZON GROUP, YAVAPAI COUNTY.

The copper claims known as the Amazon Group are upon Castle Creek, in the southern portion of Yavapai County. They are known as the property of Bob Groom. It is reported that portions of the large ferruginous outcrops assay well in gold.

SAN CARLOS COPPER CLAIM.

Claims of this name were located in August, 1870. They are about 7½ miles south of the Cottonwoods, toward the Gila River. Copper ore occurs here in vein-like layers associated with quartz in granite. These layers are irregular in extent and form and are not continuous, but crop at intervals and irregularly. The seams vary from 2 inches to 2½ inches at the broadest places of the undecayed ore. This ore is largely silicate and carbonate derived from the decomposition of vitreous copper sulphide. The incline shaft, in December, 1881, was about 30 feet deep, at an angle of 40 degrees.

RAY COPPER MINES.

These claims are in the eastern end of Pinal County, on Mineral Creek, a tributary of the Gila River, and about 6 miles from Riverside. There are several claims in this group on and about Ray Hill. The Ray claim in 1883 had been opened to a depth of 80 feet vertically, or 130 feet on the incline, below the tunnel level. The tunnel extends in a north and south direction 190 feet. The copper ore is contained in a bed of felsite, which is considerably decomposed and softened. The ore is different from the usual oxidized compounds which enrich rocks of the same class in the Clifton district and elsewhere in central Arizona, but the arrangement of the ore masses in the bedding of the rocks is apparently similar. The richest portions appear to lie in lenticular bunches trending in a northwest and southeast direction and separated by barren ground. Concentration will probably be necessary to secure profitable results. It is claimed that a sample of the copper-bearing stuff averaging only 3.7 per cent can be concentrated so as to give a product of ore averaging 23 per cent. The presence of both gold and silver is claimed for this ore. There has been extensive underground working aggregating over 1,000 feet of levels and tunnels, but as the mine has been shut down for several years it is not probable that many of these openings are accessible. The property has been extensively prospected during the year 1899 by means of the diamond drill to a depth of 800 feet. The results are not publicly reported, but it is believed that they were satisfactory and that they will lead to active development by an English company.

THE KENNEDY-BRYAN GROUP.

This group consists of nine full mining claims and three mill sites so located at Riverside, Pinal County, upon the left or south bank of the Gila River as to cover numerous outcrops and indications of copper-bearing deposits. The property was visited and examined by me in February, 1899. The names of these claims are: Augnes, Hunters No. 1, Hunters No. 2, Bryan No. 1, Bryan No. 2, Bryan No. 3, Bryan No. 4, Bryan No. 5, and St. Karl. These are each 1,200 by 600 feet. The mill sites are known as W. J. Bryan No. 1 mill site, the Hunters mill site, and the Augnes mill site. They are so located as to give good places on the bank of the river for furnace or other work. All these claims have been surveyed by A. J. Colton, United States deputy mineral surveyor, Florence, and their relative positions are shown upon a map made by him. This group is at Riverside, 32 miles east of Florence, and about 41 miles from Picacho, the nearest station on the

Southern Pacific Railroad. It is believed that the parties now reopening the Ray mine, which is near this group, will soon open up a good roadway from Riverside to Picacho.

ROCK FORMATIONS.

The foundation rocks of the group are granite with a few croppings of quartzite and of limestone, the whole being cut or traversed by thick depths of plutonic rock, which may be called greenstone or diorite. There are two chief intrusions of this nature trending in an approximately east and west direction.

Copper ores are developed at and near to the contact of their greenstone dikes with the granite. These ores show as seams and veins from a few inches to a foot or so in thickness. At places there are two or three such seams parallel to each other separated by softened or decayed rock, all highly colored by oxide of iron.

The general mineralization of the region is shown by the prevalence of the red oxide of iron by which the rocks are stained and impregnated on each side of the veins of copper ore; and these are heavy croppings of iron oxide in the form of hematite associated with quartz in crystals indicative of a regularly formed lode or vein of large size.

The outcroppings of copper ore is so frequent and widespread that it is difficult to describe. It shows a general mineralization, but there are two or three main lines of cropping upon which work of a comparatively limited and superficial character has been done.

The outcropping ores as usual are the results of the oxidation and change of the normal sulphide ores in depth. These oxidized ores are the carbonates and oxides of copper with some silicate, all intermingled with oxide of iron and with the siliceous portions of the rock.

As a rule these surface ores are basic rather than acid; that is, the iron oxide prevails as the gangue rather than silica. And where the gangue is siliceous it is much impregnated with iron. As a rule also these surface ores are high grade and give good returns by assay.

The ores in depth (as shown by two shafts) are sulphides of the ordinary yellow copper ore (chalcopyrite), mingled with ordinary iron pyrites, and in a gangue consisting largely of calcite, some iron carbon, and of quartz.

The presence of some high-grade vitreous copper or copper glance has been noted in or near some of the outcrops of the veins in association with the oxidized ore. This, I regard as one of the results of oxidation and concentration; as a secondary product rather than a normal one, such as will be found in depth.

The presence of both gold and silver in notable quantities is claimed for these ores, but the assays so far as made fail to support this claim; gold being present in only very small quantities in the pyritic ore and silver to the extent of from 1 to 3 ounces per ton. (See the tabular statement of assays.) There are, however, portions of the heavy croppings charged with iron which look like gold-bearing rock. These require exhaustive and careful testing to determine whether they are sufficiently charged with the precious metal to pay to work. Chimneys or chutes of pay ore may possibly be found upon these lodes.

The principal development is upon the claims Bryan No. 1, Bryan No. 2, and Bryan No. 3. Special descriptions of each claim follow.

Bryan No. 1.—This is the most northerly of the series of four claims covering the chief outcrop of ore. Upon this claim there is a well-defined outcrop of copper ore following the south side contact of the greenstone with the granite. This outcrop assumes the form of a regular vein, standing in a vertical plane in full view at the top of the deepest shaft on the group at the side of a gulch. The croppings consist of oxide of iron and iron-stained rock. The copper-bearing part at the surface is from 12 inches to 24 inches wide or thick, but it widens below, and is claimed to be 5 feet wide or more. This is an old shaft sunk by the old Ray Company years ago, and was well timbered, but the planking at the sides has decayed and it is not safe to go down into it, hence it could not be examined in depth. It is vertical, 300 feet deep with two drifts, one to the eastward for about 100 feet—some say 140 feet—and one to the west. A specimen hand sample of the average ore at the cropping is ferruginous and siliceous streaked with layers of silicate and carbonate of copper, and yielded 12.6 per cent of copper by assay. (Sample H of table.) The ore below the 60 or 100 foot level is believed to be in the condition of sulphide, the form of ore which could not be easily worked at the time the shaft was sunk. The continuity of this lode for a considerable distance westward across the gulch and up the hill is shown by several outcrops in line on which there are two or more open cuts. One shows a silicate ore over a breadth of about 24 inches including the green staining with red oxide of iron, of which there is a considerable breadth. The best ore measures about 12 inches. A second open

cut shows iron croppings and copper stains pitching southwardly. Most of the copper seams dip to the south.

Bryan No. 2.—This claim parallel to and adjoining No. 1 on the south side is perhaps the most important of the group. It has numerous openings proving the continuity of the veins of copper from nearly one end to the other.

At one of the central openings a crosscut on the surface some 30 feet or more in length shows three distinct seams or layers of good copper ore each from 6 inches to 18 and 24 inches in breadth, including the copper-stained rock, but ferruginous soft rock lies between and on each side of these seams over a breadth of 12 feet or more, leading to the conclusion that the mineralized ground below has at least that breadth and probably a greater breadth. These copper-ore veins or strata are parallel and dip to the north. Samples F, I, K, and L came from these veins, showing, respectively, 21.5 per cent, 16 per cent 20.2 per cent; and 15.9 per cent giving an average of 18.40 per cent. These are the upper, carbonated oxidized ores. The nature of the ores below is shown by a shaft sunk 100 feet deep upon the same line of strata or veins a short distance up the hill. At the bottom of this shaft the ore is mostly in the condition of sulphides. It is a mixture of copper pyrites with iron pyrites, the iron being more abundant than the copper. A general average sample taken across the work of this shaft 4 feet at the bottom (sample A) yielded by assay at the rate of: Copper, 11 per cent; silver 1.23 ounces, and gold 0.04 per ton of ore. The average of other side of the shaft, also about 4 feet wide, showed in the aggregate about 2 feet of sulphide ore, a layer next to the hanging wall being mostly iron pyrites. This yielded by assay (sample B): Copper, 8.1; silver, 2.61 ounces, and gold a trace. These results from the 100 foot shaft are the best index and evidence we have of the nature and average assay value of the normal sulphide ores of these claims. They average for this shaft 9½ per cent.

Bryan, No. 3.—Upon this claim there are open cuts and two shafts, but not now safe to descend. At one of these shafts a pit of sulphide ore, from which the best quality has been shipped to the smelter, shows the mixture of yellow copper ore, iron pyrites, and calcareous spar and quartz. An average sample of this ore, excluding the surfaces, gave the result of 10½ per cent by assay. At the extreme eastern end of No. 3, upon the hillside facing the Gila River, there is a large outcrop of brown siliceous ore filled with streaks and films of copper silicate. There is a large cropping extending some 30 feet, from which 10 to 15 tons have been thrown down from a face of ore 4 feet wide or thick. An average sample taken of this ore (sample D) yielded by assay 6.4 per cent. There is an excess of silica, though considerable oxide of iron is present. This brown ore is somewhat like that called mahogany ore at Clifton, and, like that ore, is accompanied by small, beautifully formed crystals of dioptase or "emerald copper."

ROSEMONT DISTRICT, PIMA COUNTY.

Rosemont, a noted copper-mining center, is situated on the eastern side of the Santa Rita range of mountains lying to the southeast of Tucson and about 40 miles distant. It is in the oak tree belt and about 4,000 feet above tide. Some of the numerous claims and locations were formerly worked temporarily by Mr. L. J. Rose, of California, and finally, in June, 1896, passed into the possession of the Lewisohn Brothers, copper brokers, of New York City. Since that time exploratory work has been carried forward on two or three of the chief claims, notably the Chicago and the other claims on the western side of the range and near the Frijole Camp. The sale included all the possessions in the district of the former Rosemont Mining and Smelting Company.

The geology of this region is very interesting, both from the scientific and purely practical point of view. It affords excellent examples of contact deposits and of replacement of limestone by ores of copper. Rocks crop out in great variety, and nearly all have traces of copper showing here and there, besides the main deposits or lodes. A very general metallization by copper is thus shown. The contacts between the chief formations are the main repositories of copper ore. There are several such contacts in the cross section of the Santa Rita Mountains, for in passing from west to east we find limestone and granite with copper deposits, as at and near Frijole Camp, then quartzite with copper impregnations, then limestone with copper at the contact, then a dike of porphyry succeeded by limestone, red quartzite, or sandstone, and finally conglomerates and slates.

The ancient quartzites form the summit of the range and these quartzites rest upon coarse porphyritic granite. The quartzite is believed to be Cambrian in age, the overlying limestone Silurian, and the conglomerates and shales Carboniferous.

A porphyry dike cutting through the limestones is marked on the western con-

tact by strong cupriferous metallization, and the limestone in turn, where it rests against the quartzite, has heavy bodies of soft ferruginous, gossan-like material, giving promise of large bodies of copper ore below. The quartzite croppings in their turn give abundant evidence of impregnation of copper by large superficial coatings of green carbonate of copper. It would appear that the great reef of quartzite extending for miles—and some 200 feet in thickness—had furnished a considerable part of the copper ore deposited in the limestone below and along the planes of contact of the two formations, the insoluble quartzite forming the foot wall and the soluble limestone the hanging wall. Under such conditions we have good reason to expect that the cupriferous solutions have dissolved the limestone, forming branches, and cavern-like deposits of ore replacing the limestone.

There are two known planes of contact where copper cores have been found under such conditions. They are locally known as the first and second contacts or the eastern and western. One is at the junction of the porphyry dike with the limestone, and the other is at the contact between the limestone and the reef of quartzite.

Narragansett claim.—This claim was located in 1879 and has the usual size, 1,500 by 600 feet, and covers the croppings of copper ore and of iron ore marking the eastern contact of the limestone with the porphyry dike. It has been prospected and worked sufficiently to show that there is a continuous body of copper and iron ore. The ledge is generally about 4 feet in thickness, consisting of ferruginous copper ore, from which shipping ore is culled by hand. It is a good smelting ore. There are some portions in which silica occurs in the ledge with the iron, but the copper is usually in the form of the rich sulphide known as copper glance or as the carbonate. The vein is opened by crosscut tunnels and by open cuts. The steep hillside invites this mode of attack. There are four such tunnels leading through the porphyry to the vein, which is then followed down by incline shafts, the deepest of which is only 60 feet below the level of the tunnel. The inclination or dip of the ore of these inclines is about 52 degrees, getting steeper as depth is gained. The dip of the vein in the upper portion is southerly and westerly toward the quartzite, but the normal dip of the formations, including the quartzite, is eastwardly. It appears probable that this dip of the upper portion of the vein and the inclosing rocks is due to the crushing down and bending over of the formations by their weight on the very steep hillside. The sections remind one of the sections of the upper part of the Comstock lode, which were so bent over near the surface as to give a westerly dip to the lode at the Ophir and the Gould and Curry claims, opening out the upper portions like a fan and dipping westwardly, while the true dip of the wall was eastwardly. A crosscut westwardly from the bottom of the deepest shaft has recently cut a considerable body of ore in the limestone under the porphyry dike. A considerable quantity of shipping ore has been taken out of this claim. As the returns from the smelter will give a better idea of the percentage value of the ore in copper than can be had from hand samples, the following have been copied from such returns:

Shipments from the Narragansett, 1896.

Weight.	Copper.	Weight.	Copper.	Weight.	Copper.	Weight.	Copper.
Pounds.	*Per cent.*	*Pounds.*	*Per cent.*	*Pounds.*	*Per cent.*	*Pounds.*	*Per cent.*
35,980	23.75	10,200	22.10	35,185	21.20	77,840	16.87
35,183	23.70	19,306	25.70	32,803	24.41	37,100	24.50
29,510	20.50	67,100	22.20	47,978	21.79	616	16.11

The sample from lot 77,840 pounds assayed 22.20 per cent by the cyanidic wet assay at the Arizona School of Mines (No. 1274), but was settled for by dry fire assay at 16.87 per cent by the smelter. The same assay (No. 1274) showed the presence of one-fourth of an ounce of gold per ton of ore. This is not sufficient gold per ton to be allowed for by the smelter, but it accumulates in the copper and is saved if the black copper is refined by the electrolytic process, and is therefore an element of profit to the smelter, making the ores more desirable for sale and causing them to command a higher price or preference over ores that are not gold bearing. It is also an important element of profit to parties who own both mines and a smelter, for there are methods of obtaining most of the gold in portions of the black copper, thus increasing the contents of gold up to the quantity essential to the economic separation of it from the black copper.

Backbone and Eclipse claims.—Directly above the Narragansett mine and lying along the summit or backbone of the range and covering the plane of contact

between the limestone and the quartzite, there are two claims, 1,200 by 600 feet, one patented, known as the Backbone and the Eclipse. These claims cover what is known in the camp as the "second contact," or the contact place between the basal quartzite and the beds of limestone. All along this plane of contact there are strong evidences of the extensive mineralization of the strata by copper ore. The outcrops are soft and highly colored with oxide of iron for a width or breadth of from 15 to 20 feet, including a body of yellow-colored, shaly, slate-like material, apparently discolored by the decomposition of the ore. This coloration and softening of the rock is especially noticeable upon the Eclipse claim, which abuts upon and forms the continuation of the northern end of Backbone claim. There are several openings on the Eclipse showing ore of good quality. There are cross cut openings at surface revealing the decomposition of the rocks near the contact, and deeper cuts, pits, and shafts showing that ore occurs of good quality. One of the shafts, about 100 feet deep, has at the bottom a crosscut drift, showing, according to Mr. Thomas Deering, vein matter with ore mixed through it for a distance or breadth across the formation of 37 feet. Of this distance 4 feet next to the foot wall is compact sulphide ore, a good ore for smelting. A sample from this 4 feet of ore sent by Mr. Deering to the Arizona School of Mines, Tucson, yielded 24 per cent copper.

Smelting works.—At Rosemont, about half a mile east of the summit, a first-class copper-smelting plant has been erected with a capacity of 60 tons of ore a day. This furnace has been standing idle for several years, but in June, 1899, it was put into operation upon the sulphide ore—first heap roasted—brought over from the Helvetia district on the western side of the range. When in blast these works give an excellent and convenient market for the ores of the district from outside claims. While the smelter at Tucson was running, some of the ores produced by the Narragansett, the Backbone, and the Eclipse claims were sent there and sold, but since the closing down of this Tucson smelter, ores have been shipped to El Paso for reduction. It is possible that a nearer market might be found at the furnaces of the Copper Queen at Bisbee. Hauling from Rosemont to the railway at Vail's Siding costs about $3 to $3.50 per ton for ores. There is an abundance of oak timber on the hills and slopes about the mines; large pine timber can be had in the higher ridges of the range to the southward where there are extensive forests. During the rainy season there is a superabundance of running water, but in the dry part of the year there is a supply from springs only. There is a fine spring and a mill site in connection with the patented Eclipse claim. The chief mine of the Lewisohn Company, from which the large supply of copper sulphide has been drawn, is on the western slope of the mountains and adjoins the Helvetia group.

HELVETIA COPPER CAMP.

The claims known as the Helvetia group, to which my attention was directed, are situated on the west side, and are entirely distinct from the Rosemont property. These claims are located under the general mining law, in the Helvetia mining district, No. 1 being on the western side of the divide of the Santa Rita Mountains, in Pima County, 31 miles southeast of the city of Tucson, Ariz., and at a general elevation of from 4,300 to 5,000 feet above tide.

The rock formations are granite at the base, overlain by limestone and quartzites, with porphyry dikes at intervals. The limestones and quartzites are much uplifted by the granite and by dikes and have been impregnated with ore of copper, especially at and near to the planes of contact. This alteration of the rocks and the impregnation with copper ore, being the result of the intrusion of Plutonic rocks from below, gives good reason to expect the ore bodies to exist in depth.

The ores at the surface and near to it are, as a rule, much rusted, and chemically changed from their original state, as sulphides to oxides and carbonates. They are in the nature and form of "contact deposits" originating at and near the plane of contact of granite or porphyry, with the limestones and quartzites. (Abstract of a report by W. P. Blake, 1898).

Of the exact form of this contract of the granite and limestone there is, at present, but limited knowledge, there not having been extensive underground explorations. The work of sinking at the Mohawk and drifting toward the limestone contact appears from general report to show that the contact plane is more nearly horizontal than vertical. The oxidized ores of the district generally are basic and free smelting, with an abundance of lime and iron for fluxing, and without an excess of silica. The croppings are ferruginous and mixed with green and blue carbonates of copper, and occasionally with high-grade red oxide

of copper. In depth, or at and near the water level, from 100 to 200 feet below the croppings, the ores change to the sulphides; to the yellow copper ore—chalcopyrite—which when pure carries 34 per cent of copper, a percentage, however, not attainable in practice. Such sulphide ores are now treated at the great copper mines of Arizona with regularity and success. They are the standard ores at the Copper Queen, the United Verde, and other leading properties.

For the most advantageous treatment of the standard sulphide ores it is important to have some of the surface or oxidized and carbonate ores to mix with the charges. The abundance of such surface ores and the large amount of iron croppings become of extreme importance and smelting value to any furnace that may be started in the district. Even iron ore that contains only 2 to 3 per cent of copper then becomes available, and the copper is saved in the operation, as also the small amount of gold generally present in the iron ore.

The district has been shipping copper ore for years, but these ores have been taken from the most superficial openings and pits here and there in a multitude of places, and without the aid of capital. The work has been done by poor prospectors who have been maintained by the proceeds of shipments of ores taken from the croppings. Within a year or so, however, the district has had the advantage of some developments by capital. There has been acquired a number of claims which are now being opened and surveyed for patenting. These claims lie on both the east and west sides of the mountains.

MOHAWK.

The chief exploration by the Rosemont Company on the west side is upon the location known as the Mohawk, where a shaft has been sunk to a depth of 165 feet, from which crosscuts and drifts have been extended, giving access to large bodies of yellow copper ore. At this single claim upward of 2,000 tons of 12-per-cent ore are now piled on the surface preparatory to the erection of a smelter at an early date, or transportation over the ridge to the furnace at Rosemont.

This development is very important to the district by giving practical proof of the nature of the ore and ore bodies below the surface, fully sustaining and verifying the theoretical deductions from the surface showing at that claim and at other claims in the district.

This underground development shows also that the main bodies of the sulphide ores extend in the direction of the Old Dick claim. The 80-foot level of the Mohawk extends eastward to within 60 feet of the end line, where, according to information and belief, the sulphide ore body is 11 feet wide. The average thickness of the ore body is stated to be about 4 feet. But the nature of such deposits is to occur in bunches or lenticular beds, and these are often of great magnitude compared with the linear extent or the surface croppings.

The following is a list of the claims, each 1,500 by 600 feet, of which a specific description follows:

HELVETIA COPPER GROUP.

Old Dick, Leader, Copper World, Exchange No. 1, Exchange No. 2, Copper Fuel, Owasco, Brunswick, Heavy Weight, Backbone, American, Flying Dutchman, Heavyweight Mill Site, Elgin, Telephone, Boston, Chance, Black Hawk, West End, Silver Spur, Wedge, Tally Ho, Triangle, Turner, Bean, Water Witch, Water Wish.

Old Dick.—This claim adjoins and abuts upon the end of the Mohawk claim on the west. The Mohawk, now producing large amounts of copper ore, is the extension of the Old Dick, and had far less showing of copper ore at the surface. The Old Dick shows copper ore in a series of pits and cuts from one end to the other, from each of which the prospectors have shipped ore of a high grade. The deepest opening is a shaft 110 feet deep, showing sulphide ore in the bottom of the shaft and oxidized ores above the surface. Beginning at the west end of the claim, where it abuts on the Mohawk, we find one discovery shaft, or pit No. 1, 30 feet deep, with an irregular open cut at the surface, in which, as well as the sides of the pit, copper ore is now standing over a breadth of some 10 to 15 feet. There are two bodies of ore separated by a few feet of copper-stained rock. One mass of ore extends vertically downward to a short drift at the bottom, showing ore. From these slight openings many tons of select ore were shipped away to the old Columbia smelter, and averaged about 14 per cent of copper; some of it ran higher. The walls are limestone. The ore bodies are fine examples of the effect of the decomposition of a body of sulphide ore in the midst of limestone, the soluble limestone being crowded away by the copper solution and replaced by

the copper carbonate and iron oxide, the iron occupying the central portion of the mass and the copper ore inclosing it next to the limestone walls. This oxidized carbonated ore will be replaced below by yellow copper sulphide ore, like that now piled on the surface at the adjoining claim, the Mohawk, averaging 12 per cent of copper.

A considerable number of tons of good ore could be immediately extracted from this opening, certainly not less than 10 tons, from the showing in the sides, and probably much more, without any dead work.

Pit No. 2: Proceeding eastwardly along the claim, similar conditions as respects ore are found in pit No. 2, a short distance from pit No. 1. There is a good showing of copper carbonates and iron over a breadth of 10 feet or more. The limestone is quite white. There are practically some 5 tons of oxidized ore in sight and about 2 tons of second-grade ore on the dump, which would yield 10 per cent, the first quality having been shipped away.

Pit No. 3: In Limestone. Over 3 feet of ore exposed. Oxide of iron in the center. At one place the breadth appears 12 feet. Shallow opening, and the ore is not well exposed. The strike or trend is seemingly east and west, and the dip to the south. The ore at each end of the cut is very promising, and a considerable number of tons could be taken out at once.

The second-grade ore left on the dump is estimated at 15 tons of 10 per cent average.

Pit or cut No. 4: Soft, green carbonate ores crop out here for 4 feet or more in thickness. About half a ton on the bank in a pile, and more on the hill above. Not fully opened up.

Pit or cut No. 5: The sides of this opening are freely stained with copper and iron, and there are from 8 to 10 tons of ore on the dump, estimated to average 5 per cent copper.

Cut and shaft No. 6: This opening is near the center of the claim and is the most extensive on the ground. An open crosscut leads through quartzite and limestone to the top of a shaft 110 feet deep. Ore stains show over a breadth of from 5 to 6 feet at the top, and continue down the shaft, where good sulphide ore comes in. The ground in the open cut shows copper green stains for 15 or 20 feet beyond the top of the shaft. At about 80 feet from the surface a short incline crosscut of 14 feet in ore leads to a crosscut of 41 feet in ledge matter. There is a considerable amount of efflorescence of bluestone (copper sulphate) on the sides of these deep openings.

Cut and pit No. 7: Another pit in ore has been opened some 15 feet east of the cut and shaft No. 6. This pit is about 10 feet deep. From the top of this pit an open cut from 8 to 10 feet wide and 40 feet long extends along the croppings easterly to another opening.

Cut No. 8: This is a large open cut about 25 by 30 feet across and 15 feet deep at the back, from which some 250 tons of ore were taken years ago to the old Columbia smelter.

Cuts 9 and 10: Passing eastwardly some 200 feet from No. 8, there are several small cuts showing ore, of which no special note was made, to open cut No. 9 some 70 feet in length, following ore, and still showing fine croppings of good shipping ore, blue and green carbonates, and some red oxide of copper. At the head of a short incline pit the ore for 11 feet in width averages 14 per cent in copper.

Pit No. 10 is 30 feet deep, and shows sulphide ore in the bottom.

Cut No. 11: This opening is near the eastern end of the claim, and is an incline 32 feet in depth, from which good ore is taken.

Leader claim.—This lies to the eastward of the Old Dick and of the Hughes Cabin, at an elevation of 4,850 feet above tide, or 300 feet higher than the Cabin. It is opened by a tunnel 100 feet long with two short drifts. There is a large body of rusty ore lying nearly flat, covering the roof and sides of the tunnel. It is not fully opened up. There is probably a body of ore underneath. It is cavernous ground, and the mines broke through into a small cave. Hughes shipped 40 tons of selected ore from this claim. The iron ore is excellent for smelting purposes. The deposit is formed near the contact with underlying granite. A large outcrop of carcenous quartz along the lower margin of the ore ground is impregnated with galenite, and is silver bearing. There are several other open cuts and pits on this property along the plane of contact with the granite, showing good ore which carries both copper and silver.

World.—Opened by an irregularly shaped open cut 75 feet long. There is here a large amount of soft ferruginous, earthly ore, good for fluxing, besides a good quality of copper ore, distributed. It has yielded well. There is a large waste dump which contains considerable ore. It averages about 4 per cent copper.

Pit No. 2 (Leader): In quartzite 30 feet. Some cuprite found here. Here is also a large dump, like that at the main opening. If it would not pay to smelt it, it might be concentrated.

Pit No. 3: This follows the contact between the quartzite and the lime, and shows about 5 feet of ore.

Pit No. 4: Considerable iron gossan and green carbonate ore mixed together; a good ore for smelting. The ore shows on all sides of the pit, and its extent is not determined.

Exchange No. 1.—There is an interesting development of beautiful azurite and malachite on this claim, extending for over 100 feet on the surface, and opened below by a tunnel of the same length. The ore body is in limestone, and varies in width from 18 to 24 inches of high grade ore, without the usual accompanying gossan. It is followed by the tunnel, and ore is standing in the bottom and roof; but part of the ore above has been stoped out from the surface downward. I, however, estimated that 100 tons might be easily taken from this part of the claim. The open cut is said to have yielded $20,000 worth of ore. The residues of heaps of ores on the surface will probably amount in the aggregate to 20 tons as good as sample No. 5 while the tonnage of the waste dump is much greater. Sample No. 6 yields over 12 per cent.

Brunswick.—A small open cut on this claim, about 10 by 15, and 6 feet deep, shows a mass of ore in the bottom about a foot in width. About 500 pounds of ore out on dump. At a second opening the face of cut, about 5 feet wide, is colored by iron and copper ore. An average sample taken across this face (Sample No. 7) yielded—per cent of copper, by assay. There are about 10 tons of ore out on the dump, but the best quality has been taken away. A second cropping or streak of ore is found about 20 feet to eastward of the first.

Heavyweight.—Upon this claim, at an elevation of 2,000 feet above tide, the plane of contact of limestone formation with underlying quartzite is marked by a belt of copper ore opened upon by a succession of cuts and irregular pits, from which good shipping ore has been taken. The ores of this contact are harder and more siliceous than the ores on the other claims, and have more garnet in them. This garnet is a product of the contact with granite, or the dykes of porphyry which also traverse this mountain. Probably 20 to 25 tons of 10 per cent ore can be gathered up at the various dumps and heaps left after sorting out the ore of best quality, a considerable amount of which has been shipped away.

Backbone.—At this claim it is evident that an included mass of low grade porphyritic ore has decomposed, leaving a mass of ferruginous gossan of nearly pure limonite in the midst of the lime rock. By following this gossan, or leached iron ore downwards on a slope for some 30 feet a considerable quantity of blue and green carbonate copper ore has been taken out and shipped away. Some ore yet remains at the bottom and is spread through a thickness of from 18 inches to 2 feet or the iron ore in alternate layers or seams or thin plates, forming an excellent mixture for smelting.

American.—This claim lies parallel with the Old Dick, on the north, and adjoins it. It also is near the hoisting works of the Mohawk. In a 20-foot pit there is a large cropping of soft iron ore from 4 to 6 feet wide, bordered with carbonate copper ore along the contact with the limestone. About 1 ton of ore is piled on the dump.

Elgin.—This claim adjoins the Mohawk mine of the Rosemont Copper Company on the west. It has several exposures of ore. Pit No. 1, in Limestone, near to the discovery and center of the claim, shows green carbonate ore. Abo .t 1 ton out on the dump. Pit 10 feet deep. A second opening in the side of arroya, at the bank, about 10 feet deep, reaches sulphide ore in fine grains, disseminated a low grade ore, but not necessarily as good as may be found at a lower level. Sample taken here yielded only 1.2 per cent. Another sample, a part of the hand specimen, gave 25.2 per cent. Assay No. 10, Pit No. 3 above, on the hill, is 12 to 14 feet deep and has good ore exposed. Pit No. 4 beyond, on the north slope of the hill, also shows good ore. Sample No. 11 from this place yielded 24.2 per cent. This was a hand sample of sulphide ore. All of these pits or openings are in a nearly north and south line. No. 4 shows an outcrop of quartz in an irregular vein. Copper stains and ore are here distributed over a broad surface, and much work is required to show the exact form and extent of the deposit.

Telephone.—This claim adjoins the Elgin, and is only slightly opened by several 10-foot pits. At No. 1, in the side of the hill, there is a much copper-stained rock, with iron gossan, and kidneys of yellow copper ore. At No. 2 Pit, about 15 feet wide and 20 feet long, the croppings show good ore, consisting chiefly of copper carbonates and iron oxide. About 1 ton of ore is on the bank. A hand sample, No. 12, yielded 22.1 per cent.

Wood and water claims.—The four claims named the Turner, Bean, Triangle, and Water Witch are for timber (cord wood) chiefly, although on the Bean there is a spring of water. There is a considerable amount of oak timber growing on these claims which cover the best portion of the northern face of the higher ridge of the Santa Ritas. Cord wood can be had at $2.50 to $3 delivered. Mining timber, from the main ridges, about 10 miles south, can be delivered at the mines for 10 cents a running foot, with the bark off, and measuring 8 to 10 inches in diameter.

Labor.—Underground miners receive $3 per day of ten hours. Surface men from $1.25 to $1.50. Chiefly Mexicans.

Distance from railroad.—The nearest railway station is 14 miles distant, at Vails Siding. The camp is 31 miles from Tucson. At present the trading being with Tucson, the ores shipped are taken to Tucson, at a cost of $3.50 per ton for hauling. The freight from Tucson to the Silver City smelter (where some of the ores are now sent) is $3.25 and to El Paso about the same cost. Reports from the property under date of July, 1899, state that development is proceeding rapidly, and that a smelting furnace will soon be in operation producing copper, also that a railroad will be built from the Helvetia mines to Tucson.

COPPER SMELTING AT TUCSON.

The copper furnaces of the Tucson Mining and Smelting Company renewed operations in 1896, and were supplied for the most of the time from the mines of the region about Tucson, chiefly from the Helvetia district, from Olive Camp, and the Sierritas. The copper ores received from July 1, 1895, to June 30, 1896, amounted to 2,200,000 pounds. The copper bullion shipped during the same period weighed 265,751 pounds, and the copper matte, 228,548 pounds. In April, 1897, a successful run was made upon 180 tons of ore, containing gold and silver as well as copper. This lot of ore consisted of the output of many different prospects or claims. One consignment of about 25 tons of high grade ore came from Sonoro, Mexico.

During the winter of 1897 and 1898 the smelter closed down and has not since been in operation.

COPPER IN THE DRAGOONS.

There are many copper-mine locations in Dragoon Mountains, east of Tombstone. Some of these deposits, formed apparently as the result of metamorphism of limestone strata by intrusive dikes of plutonic rock, contain quantities of a green garnet, which, being heavy and mingled with ore, is apt to deceive many regarding the richness of the ore. The garnet also is objectionable in the furnaces of the smelters, as it makes a thick, pasty slag and impedes the smelting.

A furnace has recently been erected by the Golden State Company, and was blown in the summer of 1898. This furnace is reported as having a capacity of 30 tons of ore a day. Coke is hauled from Cochise Station, on the Southern Pacific Railway. Some difficulty was experienced with the garnetiferous ore, but no further report has been received.

Another property farther south in the same district is the Black Diamond, which gets its name from an immense outcrop of lustrous black iron ore. It crops out along the contact of a dike of porphory with beds of limestone, and is composed of specular iron, magnetic iron, and quartz intimately mingled, so as to form a very hard mass. Through this mass there are strings or patches of fine copper ore, irregularly distributed and not as much segregated and separated from the mass as is desirable. The ore, when pure, consists of bornite, the variegated copper sulphide known also as erubescite. It is a beautiful ore and a desirable one, as it also carries silver. By the decomposition of the stringers and bunches of this copper ore a considerable amount of copper green staining results.

The development of this deposit consists of open cuts, tunnels, and a shaft about 60 feet deep, with a drift and crosscut at the bottom, most of which is in iron ore too lean in copper to pay for extractions; some good ore has been selected from the various openings and has been shipped to smelters and gave good returns.

The Black Diamond is near to the summit of the Dragoons, nearly west of the Commonwealth mine, at Pearce, about 6 miles distant. The altitude is about 6,000 feet. There is a large development of stratified limestones, sandstones, and quartzite, forming the crust of the range at that point, and extending northward to and beyond the "South Pass."

Later reports from the Black Diamond show that development has progressed actively during the spring and summer of 1899, and that large bodies of ore have been encountered.

Middlemarch.—This claim in the Dragoon Mountains, Cochise County, produced about 20 tons of black copper in 1898 and a very little matte. The ore is highly siliceous, with much of the mineral garnet in it, and closely associated with the ore, making it difficult to smelt. The average content of copper is about 5 per cent. The furnace, a round one, of 50 tons capacity, was made at the Denver Iron Works. It was run irregularly. There was considerable difficulty at first in getting the proper smelting mixtures. The black copper produced ran about 98¼ per cent copper, and the small amount of matte assayed about 75 per cent. As the more highly pyritic ore was reached below the surface, the quantity of matte was increased.

Golden Gate claim.—Messrs. Fitz and Barrett erected a small smelting plant upon this claim in the Dragoon Mountains, making use of the old furnace from the Donnelly claim in the Chiricahuas. A small amount of copper was produced, but in September, 1898, the work was closed down.

COPPEROPOLIS GROUP.

Dr. A. H. Noon, of Nogales, described a group of three claims known as the Right Bower, Copperopolis, and Left Bower, near the Jalisco Mountains, in the Oro Blanco district, Santa Cruz County. They are 60 miles from Tucson. They are in the condition of prospects, but have been superficially developed by open cuts and pits, and some ore has been shipped and high-grade ores can be selected. Assays show the general presence of silver and a trace of gold and copper from 9 to 48 per cent. The property invites development.

SILVER BELL DISTRICT.

The old Silver Bell district mines, which for a decade or more have been neglected, have again been brought into prominence by the erection of a smelter and the active production of copper. It is also reported that most of the properties have been purchased and will be worked under one management, but no particulars have been received. The district lies in Pima County, in the Silver Bell Mountains, about 40 miles west of Tucson, and 20 from Red Rock Station, on the Southern Pacific Railroad, from which supplies and coke are hauled and the black copper is shipped. The rocks are porphyry and limestone. Many of the deposits of copper ore are found along the planes of contact of these formations. There are several groups of claims; one of the oldest locations of the camp is the Old Boot mine, from which a considerable amount of ore was taken in former years. It is now known as the

Mammoth.—The smelter now running (1899) is in connection with this claim, and is 1¼ miles distant, in the foothills of the Santa Rosa Valley. It is a 30-ton water-jacket plant.

The mine is opened by a shaft and tunnel. The shaft, in May, 1899, was 150 feet in depth, and a crosscut of 50 feet exposed a body of copper sulphides, with some galena and blende.

SILVER BELL GROUP.

This consists of 14 claims. The chief work of development has been upon the Imperial, Southern Beauty, Page, and the Prospector. According to Mr. Judson, of the Denver Mining Reporter, who visited the district in May, 1899,

"A 200-foot tunnel has been driven in on the Imperial, opening up several pockets of lead carbonates. The Southern Beauty is opened by a shaft 160 feet in depth. The vein is on the contact between lime and porphyry, but the shaft did not open up the main bodies of ore unquestionably existing on this contact. The Page has a long tunnel, which opened up some small ore deposits. The Prospector has been opened by a shaft 50 feet in depth and a crosscut tunnel 220 feet through the porphyry. There has been about 4,000 tons of lead carbonates shipped from these properties several years since and some copper. Very little work has been done for several years, but we understand that active development will soon be commenced on this group."

RED ROCK.

This group comprises several claims, which have been opened by shafts, open cuts, and tunnels. The deposits are near an outcrop of the granite.

CREPNA GROUP.

There are two claims—the Young America and the Young America Extension. They are in the foothills, in the valley southeast of the Silver Hill mine. The Young America is opened by a shaft 60 feet deep with a drift west 40 feet and south 20 feet and east 100 feet, with a winze of 75 feet.

SIXTY PER CENT GROUP.

About 1,500 feet northeast of the Young America. Two shafts 70 feet deep.

COPPER PRINCE GROUP.

There are ten claims in this group: The Stone Cabin, Equity, Danube, Copper Prince, Princess, Azurite, Copper Carbonate, Lead Carbonate, El Plomo, Nightingale, Georgia, Mountain Dew, and Iron mine. The chief work has been upon the Copper Prince, where there are several open cuts, tunnels, and shafts.

DOXOLOGY AND TRUE BLUE.

These two claims lie north of and parallel to the Coper Prince. The ores on these properties appear to be galenite and lead carbonate and not copper ores.

ABBEY WATERMAN.

There are five claims in this group—the Paddy Woods, Homestake, Carbonate, and two others. The ores are chiefly of lead, claimed to average for the selected ore 40 per cent lead, 40 ounces silver, and gold to value of $5 per ton. May turn into copper in depth.

MARS GROUP.

Consists of five claims about 2½ miles northeast of the Young American and of comparatively recent location. Some 40 tons of rich copper ore have been shipped.

OLD BOOT MINE.

This property, in the Silver Bell district, Pima County, near Red Rock, about 50 miles west of Tucson, has produced considerable copper. The ore has been smelted at the Nielson smelter. They are mixtures of the oxidized and carbonated ores, with some sulphides. They carry from 42 to 47 per cent of silica and from 16 to 20 per cent of iron. The ores of the large dumps carry smelting over 9 per cent of copper. There is not an appreciable amount of gold, but there are about two ounces of silver, giving about 20 ounces in the copper bullion. The smelter has a capacity of 30 tons. The copper bullion assayed about 98.8 and the matter 78.90 per cent. This mine is now being worked profitably and bids fair to become one of the large copper producers of the Territory. A smelter is in operation on the mine.

RED ROCK COPPER COMPANY.

The Red Rock Copper Company property consists of several mining claims in the Silver Bell mining district, in the county of Pima, Territory of Arizona, called the Uphill mine, the Burtis mine, the Peacock mine, the Daisy mine, the Wilson mine, the Bay State mine, the Mount Hope mine, the Western Slope mine, and the Wellington mine.

ATLAS MINING COMPANY.

Ores presented to the mineral collection of the Arizona School of Mines by Col. J. W. Locke, from the Metropolitan mine of the Atlas Mining Company, are fine masses of high-grade yellow sulphuret of copper. This copper is in the Silver Bell mining district, and is supposed to be near the claims of the Red Rock Company.

REMARKABLE COPPER CONGLOMERATE.

A few miles north of the Lost Gulch Gold mines, across the hills, there is a very remarkable superficial deposit of copper penetrating a rough conglomerate

breccia, apparently a tufaceous deposit capping the older rocks in horizontal layers. The fragments, cemented together by carbonate and silicate of copper, are of various sizes and colors—brown, green, yellow, red, and black predominating. The more sandy portions filling the spaces between the larger pebbles seem nearly saturated with copper carbonate, and many of the softer pebbles are unveiled with a coating of copper ore. In other portions pebbles seem to have been dissolved out, leaving a hollow mass of high-grade copper ore. The deposit is apparently the result of the overflow of cuprious solutions from some neighboring decomposing bunches of sulphide ore.

GOLDEN RULE.

This property, now worked under the name of the Golden Queen, Consolidated, was known in the year 1884–85 as the Golden Rule. It is situated in Cochise County, at the northern end of the portion of the Dragoon Mountains, south of the Southern Pacific Railroad, from which the camp is not more than half a mile distant. It is about 6 miles east of Dragoon station, and the nearest point or stopping place on the railroad is Manizoro siding. The elevation is about 4,700 feet. The vein is well and strongly defined, consisting of white quartz well mineralized with iron and lead sulphurets. It traverses the limestone parallel with the bedding and is near the basal contact with a strong dike of quartz porphyry, which appears to have disrupted and uplifted the sedimentary formations, and to have produced considerable alteration or metamorphism. The strata immediately underlying the vein are more siliceous and sandy than those above. In fact the footwall country may be said to be sandstone and shale and the hanging-wall blue limestone. The thickness of the vein ranges from a few inches to 24 and 36. The trend is nearly east and west, and the dip is northward at an angle of 35°. It can be followed for the length of the claim and is opened at many places, from which paying ore has been stoped out down to the first level about 250 feet.

Free gold can be found in the quartz on the dump. The best ores have been shipped away. The want of water for milling purposes has prevented milling the ore at the mine. Efforts to obtain water by drilling down into the lower slopes of the Sulphur Spring Valley about half a mile east of the mine have not been successful. A 5-inch bore hole has failed to reach water at a depth of 224 feet. It seems probable that water can be had at a greater depth in the mine by keeping near to the contact with the dike of porphyry.

COPPER AT DRIPPING SPRINGS.

Copper mines at this locality, near Skinnerville, 25 miles south of Globe, have attracted considerable attention, especially the Copper King and Rattler claims.

COPPER CLAIMS NEAR FLORENCE.

According to the Tribune there are promising copper-bearing claims about 10 miles east of Florence and 3 miles south from the Gila River, near the Florence and Globe road. About twenty years ago John D. Walker located and worked a mine in this district, sinking a shaft to the depth of 30 feet, from which he shipped 5 tons of ore that realized, it is said, the sum of $2,000 in silver and copper. With depth the silver became less and the copper more, and as he was looking for a silver mine, which he found in the Vekol about that time, this mine was abandoned and remained so until a short time ago, when W. R. Stone and A. T. Colton, not being afraid to do some work on an abandoned claim, located and worked the same, finding the ore extensive and continuous, and have opened up by shafts and crosscuts large bodies of high-grade ore on the mines known as the Georgian and Marian, from which they have shipped a large amount of ore. William M. Griffith and others have done more than 100 feet of work in shafts and drifts on the Half Moon mine, from which has been taken a large lump of ore that will assay without assorting at least 20 per cent in copper. One sample across the width of the shaft gave an assay of $9.35 in gold. The Accumulation mine, on which has only been done the location work in a shaft 10 feet deep, shows copper glance assaying 70 per cent copper. This mine is owned by Dr. J. M. Hurley and W. R. Stone. The Madam Denny mine shows a ledge at least 10 feet wide of copper ore, and that taken from the shaft on development work will average 15 per cent in copper. This mine is owned by Mrs. Kate M. Stone.

COPPER ORE NEAR CASA GRANDE.

Some very interesting samples of siliceous copper ore and carbonate of copper have been sent in from time to time from the districts about Casa Grande, but there is little or no reliable information regarding the nature or extent of the deposits.

BLUE EAGLE.

Located in Harshaw district, Santa Cruz County, by James Hale, Harshaw. The vein, according to Mr. Hale, is from 2½ to 5 feet wide, and carries ores of copper and silver averaging from 20 to 31 per cent of copper and 12 ounces of silver. This vein is opened by a tunnel 180 feet long, a shaft 30 feet deep, and a winze 33 feet. It is situated about 2½ miles north of the World's Fair mine and 3 miles from the Sonora Railway.

There are no reduction works. The ore is hand sorted and is shipped to the smelter at El Paso.

FARRELL GROUP.

This group of mines consists of the Morning Glory, Red Top, and Sunset mines. These are located in the Harshaw mining district, in the new county of Santa Cruz. The ores consist chiefly of the yellow copper pyrites—chalcopyrites—and yield 17 per cent of copper by dry assay and 15.4 ounces of silver. The openings are one shaft 82 feet deep, and one of 50 feet and 150 feet of drifts. The vein is reported as 5 feet wide between walls; to have the characteristics of a fissure vein, and to have yielded free milling silver ore to a depth of 50 feet.

WISCONSIN AND ARIZONA MINING COMPANY.

According to official documents this company is a Wisconsin incorporation holding mining ground in the Tyndall mining district, in Pima County, as follows: The Helvetia mine, begins at the initial monument in the center of mine, from which United States mineral monument on Helvetia Hill in said Tyndall mining district bears south 68° 51′ east 1,991 feet distant, extending thence in length 750 feet easterly and 750 feet westerly along the course of the Helvetia lode, and 300 feet in width on each side of the center of said lode; the corners and centers of end lines marked with posts in mounds of stones, being the mine conveyed to the company by United States patent recorded in the office of the recorder of said Pima County, in book 18, Deed of Mines, at page 611.

COBREZA.

Located in the Cabafi mining district, Pima County, 6 miles from the Fresnal Well and about 60 miles from Tucson. The ores consist of gray copper, ranging from 15 per cent upward, and they carry about 25 ounces of silver. In the early sixties ores were shipped from this claim to Swansea, England. Shipments are now made to Silver City by way of Tucson. There is not any mill for reducing the ore on the property. It is hand-sorted for shipment. The development consists of open cuts and pits not to exceed a depth of 45 feet. The vein in places is 8 feet wide between walls, and the ore-bearing part is said to average 3 feet. The claims are patented.

QUIJOTOA COPPER.

In addition to silver and gold bearing lodes, for which the Quijotoas are chiefly noted, copper deposits have been opened recently by Alex. McKay and his associates. This district is in Pima County and about 85 miles west of Tucson. There is a group of six or seven claims located for copper and the Bill Nye and Wadsworth for gold. The copper-bearing claims are known as the Waldon, Iron Cap, Brittle Silver, Magnet, Copper Cliff, Glasgow, and Triangle. A considerable quantity of ore was extracted and carted over to the Saginaw smelter, but had to be hand-sorted after delivery, so as to get ore of a grade suitable for smelting. It was designed, however, chiefly as a flux for other ores. It contained a large percentage of iron ore, and is supposed to cover a deposit of higher grade copper in the lode at a greater depth.

THE BRADFORD MINE.

In Tyndall district. A patented claim opened by a shaft 200 feet deep with short drifts and crosscuts. Operations have been resumed and the shaft on the

Bradford has been cleaned out and retimbered, and preparations are making for the extraction of copper ore. Assays at the Arizona School of Mines show that the ores will average 14 to 15 per cent copper and over 3 ounces of silver to the ton. This property is near the railroad, and about 10 miles below Crittendon, the nearest post-office and supply point.

COPPER DISTRICT AND CLAIMS ALONG THE COLORADO RIVER.

In the decade from 1860 to 1870 the copper mine prospects along the east bank of the Great Colorado excited much attention. There indications of valuable copper deposits may be said to occur at intervals from Castle Dome to Bill Williams Fork and beyond into Mohave County northwards. The following memoranda are condensed from notes relative to the principal claims of Williams Fork district and the La Paz district.

Planet claim.—Located on Williams Fork about 12 miles from the Colorado River. The ore occurs in limestone and is associated with specular iron ore. A shaft 40 feet deep and an incline 50 feet with two tunnels of 50 feet each constituted the development. The shipments of ore amounted to some 400 tons of high grade claimed to have contained from 40 to 45 per cent of copper. Large quantities of second-class and low-grade ores were left upon the dumps.

Eliza lode.—Great Central Company. This claim is also upon Bill Williams Fork and about the same distance from the Colorado River as the Planet Claim. The development consisted of a shaft 50 feet deep and a tunnel 80 feet deep. Shipments had amounted to about 50 tons of 15½ to 25 per cent ore. One hundred tons or more had been raised to the bank but had not been sorted. The first-class ore carried from 30 to 40 ounces of silver to the ton and some gold. A furnace for making copper regular or matte was in course of erection and had an expected capacity of 10 tons a day.

Mineral Hill.—One and a half miles from Bill Williams Fork and 10 miles from the Colorado.

Apache Chief.—This claim in the La Paz district south of Bill Williams Fork had shipped about 100 tons of ore to San Francisco from a shaft about 20 feet deep. The oar contains considerable oxide of iron.

Blue ledge.—Seven miles from the Colorado River. Incline shaft 80 feet deep. About 20 tons of 15 per cent ore out. Ledge about 2 feet wide.

Weaver mine.—Shaft 80 feet deep. Abandoned.

American Pioneer.—About 10 tons of low-grade rock was shipped. Abandoned.

Colorado.—Shaft 40–50 feet deep. About 5 tons shipped and about 100 tons of ore only not sorted.

Cozelte.—An incorporated company. Opened by an incline shaft. Work stopped.

Other claims were known as the Greenhorn, Lula, and the Green Mountain. From the Hibernia about 20 tons of ore had been sent to San Francisco at a cost of $33 per ton. From the Benefactor about 20 miles up Williams Fork about 20 tons have been shipped.

HAAS GROUP.

Situated on the Colorado River about 100 miles above the Needles following the river. They are 80 miles below the placer mining locations of the Temple Bar Mining Company. The copper ores occur in granite. The country is rough and hilly. The nearest railway station is Kingman, thence 19 miles by stage to Mineral Park. From Mineral Park 12 miles in saddle to claims. Steamboats on the Colorado can land at the bank. Wood is obtained from the drift-wood on the river by means of a boom.

GRAND REEF.

In Graham County, about 50 miles from Willcox, extensive cropping showing ores of copper and of lead, cuprite, and galena occur at the surface. It was purchased some years ago by Mr. John W. Mackay, and is being thoroughly developed by working before any attempt is made to utilize the ore. A shaft has been sunk to the depth of 500 feet, and drifts have been extended from it at each 100 feet of depth, The ore extracted in this opening up of the mine is piled on the surface. A permanent and comfortable camp has been established, with the confident expectation of a profitable and permanent enterprise.

THE PIETY GROUP OF COPPER VEINS.

The following data concerning the Piety group of copper claims are compiled and condensed from an unpublished short descriptive report on the property by Prof. George W. Maynard, of New York. This group is situated on the south side of the Gila River, Ripsey mining district, Pinal County, Ariz. The property is reached via the Southern Pacific Railroad to Casa Grande, and thence by stage over good roads to Florence, the county seat and the center of a flourishing agricultural district, 23 miles from the railroad, and then an additional 38 miles to Riverside, on the Gila River. The district is relatively accessible as compared with many other copper-producing districts in Arizona in their early development. The property consists of six full claims, 1,500 feet in length by 600 feet in width, a total of 123 acres. In addition there is a mill site of 15 acres, with an extent of about 2,250 feet of river front and an average width extending back of the river of about 300 feet. The total surface is, therefore, 138 acres. In the immediate district the only important development work has been on the Ray Mine, which, it is said, will soon be worked in a large way. A modern smelting plant has already been erected. The claims included in the property are known as:

	Feet.
Piety No. 1 and Piety No. 3, on the same vein	3,000
Piety No. 2 and the Gila, on the same vein	3,000
The Gerald	1,500
The None Such	1,500
Total	9,000

Piety No. 1 and its extension and Piety No. 3 are parallel to Piety No. 2 and its extension, the Gila. The surface showing consists of bold outcrops, which as a rule stand well above the surrounding country, so that the veins are readily traced. The general course of the veins is northeast and southwest.

Piety No. 1.—Development: About 250 feet from the west end of the location there is a prospect hole 12 feet in depth, but as it is not on the vein, which lies to the north, there is no ore. A drift 110 feet east of the prospect hole has been carried in 6 feet from the face of the mountain, and at the end a shaft has been sunk 21 feet. As this drift is entirely in the outcrop it did not show other than the characteristic copper stains of carbonate of copper. A sample, however, was taken for the entire length, which showed by assay: Copper, 16 per cent; gold, trace; silver, two-tenths of an ounce. This assay is only of value because demonstrating the existence of copper in the outcrop. The shaft leaves the vein about 15 feet below the collar. The vein is 12 to 24 inches thick, and disappears in the foot wall where it is widest.

Deep shaft.—Depth, 57 feet. A drift has been extended north 27 feet at a point 46 feet below the surface; width of drift, 3 feet 6 inches. The vein in the back of the drift measures 2 feet and has the usual green and blue carbonates scattered through it, but of too low grade for working. The drift was sampled for the entire length, excluding two or three inches of a rich streak which is persistent for the entire length of the drift in the back adjoining the front wall. Assay value: Copper, 2.23 per cent; gold, trace; silver, 0.47 ounce. On the south side of the shaft a drift has been started which is already in 4 feet. The vein is better defined at this point than elsewhere and has a width of 2 feet 10 inches of workable ore made up of the blue and green carbonates of copper, with a little red oxide of copper scattered through the mass, the gangue mass being an iron-stained quartz. The entire exposure was sampled. Result: Copper, 9.26 per cent; gold, 0.03 ounce, 60 cents per ton; silver, 9.90 ounces, $5.74 per ton.

The vein cut in the upper shaft should also be followed.

Piety No. 2 is a parallel vein to Piety No. 1 and strongly marked by its strong outcrop. A shaft 13 feet 6 inches in depth has been sunk 50 feet west of the center of the location. The shaft is 8 feet in length north and south, and from the bottom a drift has been run 8 feet northwest. The only show of ore is 4 inches of a low-grade carbonate which cuts into the hanging wall. This is a favorable point for exploration.

Piety No. 3 is the east extension of No. 1 and is readily traced by the outcrop. Near the center of the location there is a 10-foot hole from which considerable carbonate has been taken. A continuous vein from the surface 10 to 12 inches in thickness is exposed at this opening, and is one of the best showings on the property. Standing at the center of the location on No. 3 and looking north one sees four distinct and boldly defined outcrops, including No. 3. The outcrops are practically parallel, and in general terms the dip is 10 to 12 degrees south.

The Gila.—This is the last extension of Piety No. 2. About 150 feet from the west end of the claim a hole has been sunk 10 feet, exposing a well-defined vein of carbonates for the entire depth.

The Gerald vein has not been as extensively prospected, but wherever holes have been dug fairly good copper indications have been found.

The None Such.—This vein as far as prospected shows exposures of red hematite iron ore, which will be an admirable flux in the smelting. An excellent quality of limestone is also found within easy reach of the property. All of the requirements for smelting, excepting fuel, are found in the neighborhood. The owners of the property erected a small experimental shaft furnace, and smelted a few hundred pounds of ore which had been gathered from the different veins. The insufficiency of blast made it impossible to put through any considerable amount of ore. The product obtained, however, was fairly good metallic copper. Borings were taken from this product, and were found to contain by assay: Gold, 0.53 ounce per ton; silver, 13.50 ounces.

SIERRITAS OR WESTINGHOUSE CAMP.

Several locations about 23 miles south of Tucson on the north slope of the Sierritas were partially opened several years ago by the Westinghouse Company, or some of the chief stockholders, who, under the advice of Dr. Peters, acquired the property and expended probably close upon $100,000 for development and improvements. The work was soon after discontinued and practically abandoned. The buildings and machinery, store, etc., were purchased by the El Grupo Mining Company and taken to Sonora, Mexico. The remnants of piles of ore left on the surface are "low grade," "rebellious," or highly pyritic and siliceous mixtures of copper, lead, zinc, and iron sulphides, with considerable silica and perhaps some arsenic. Appearances indicate their occurrence in considerable quantities in masses intercalated in the bedding of the strata. The records of over 100 assays left in the books at the mine show the general presence of copper ranging generally in percentage from 2 per cent to 20 per cent. Some of the assays yield as high as 40 per cent, but these were from kidney-shaped bunches of exceptionally good ore. The average of 93 copper determinations is 9.54 per cent, and of 28 determinations of zinc, 15.64 per cent.

CASTLE CREEK COPPER-MINING DISTRICT.

One of the most promising mining districts in the Territory is the Castle Creek copper-mining district, situated in the southern part of Yavapai County. This district embraces a large area, and lies east of the Hassayampa River and within easy access to the Santa Fe, Prescott and Phœnix Railroad. The Castle Creek and its numerous tributaries traverse the entire district and furnish a plentiful supply of water for all domestic and mining purposes. The principal mountain ranges embraced in this district are: The Silver Bradshaws, the Buckhorn Range, and the eastern slope of the Red Picacho Range. The formation of this district from a mineralogical standpoint is varied, and furnishes a highly interesting study for the student of nature and her forces. A part of the district is highly metamorphic, notably the northern and western half, while the southern and eastern parts are exclusively eruptive. The country rocks may be classified as follows: Felsite, andesite, diorite, and granite, with schistose and ryolite dikes in the northern half, and trachyte, with extensive deposits of conglomerate, tufa, and lava for the southern half. The region has been subjected to severe dynamic forces. The schists and other disturbances have resulted in numerous fissures, fractures, and faults, forming planes along which the mineral waters found easy passage, resulting in the formation of more or less extensive mineral deposits and veins carrying copper, gold, and silver. The zone of greatest activity in the deposition of mineral is apparently along the borders of the eruptive rocks, where they break into or contact with the metamorphic rocks. This zone covers a width of from a half a mile to more than 2 miles; in length, a distance of more than 15 miles. The district is comparatively new from a mining standpoint, although some mining for gold and silver has been prosecuted for several years. It is of recent date that attention has been attracted to the large deposits of copper found in this district. Five large groups of mines are now being actively worked in the Castle Creek copper-mining district, embracing the Copperopolis group as of first importance in activity of developments. This group consists of 28 claims and 9 mill sites. Three mines are located in the southeastern part of the district about 2 miles from the town of Briggs, and development work is being vigorously pushed, some 500 feet of work being already completed. The work so far shows a large

vein of copper-bearing ore. The vein averages in width from 20 to 100 feet along its strike, and runs for 2 miles on the Copperopolis property. The vein is a typical iron-copper vein, carrying bunches or bands of copper ore in the iron caps. The vein stuff shows a uniform value in gold of $8 to the ton. The proposed development is to work through the capping or gossan to the water level and open the mine at the sulphide base.

The Jones group of mines are situated on the Copperopolis vein, and extend for 7,500 feet on the west extension of the vein. These mines are being worked by a separate company, and are at a depth of 250 feet, producing some fine copper and gold ore.

The Swallow group, located on a tributary of the Castle Creek, have been in the past worked for gold, and have produced gold in paying quantities. They are now being worked for copper, it having been determined that the mines are copper mines as well as gold, the gold of the vein being so far obtained by milling the gossan of a copper mine. It is proposed to install machinery at an early day for working the copper ores.

A third group of copper and gold mines is the Whipsaw group, located at the head of the Whipsaw Gulch. These mines have recently been partially opened and show very rich values. It is said by competent experts that there are now exposed 5,000 tons of copper ore that will average 15 per cent copper and $10 gold to the ton. A complete smelting plant is now being built to the Colorado Iron Works for this group of mines.

In the Buckhorn Range some very fine prospects are being worked for copper. It is now practically assured that the Castle Creek mining district will soon occupy a prominent place among the various copper-producing districts of Arizona.

THE COPPER DEPOSITS OF COPPER BASIN, ARIZONA, AND THEIR ORIGIN.

[From the transactions of the American Institute of Mining Engineers, New York meeting, February, 1889.]

Copper Basin, in Yavapai County, Ariz., about 10 miles southwest of Prescott, is well named. It is a depressed area and a region of cupriferous impregnation, the principal development covering an area of about 40 acres. The geologic conditions are simple. The foundation rock is a coarse-grained granite and gneiss, in which soda feldspar predominates. There are also dikes of porphyritic rock and a large quartz vein containing pyrites.

Superimposed on this crystalline foundation we find heavy beds of mechanically formed rocks, conglomerates, breccias, and sandstones in horizontal layers cropping along the bed of a creek, and apparently the remnants of a much more extended formation, now denuded and largely carried away by gradual atmospheric erosion.

The heavy beds of conglomerate are in many places much broken and tilted up, even standing on edge in large blocks, as if they had been lifted by some great convulsion; but the cause is much more simple, being merely the removal by gradual disintegration of the softened and decayed granitic rock below.

The materials of these sedimentary beds are chiefly fragments of granite, gneiss, and plutonic rocks loosely mingled. They are the chief repositories of the copper ore, which forms the cementing substance. This copper ore is the blue and green carbonate azurite and malachite, and the ore is so generally spread through the mass of the beds that the blue and green croppings can be seen at a great distance, particularly after or during a shower of rain, when the colors are extremely brilliant and beautiful.

The copper carbonate is not only a matrix and a cementing material for the fragments of rock, but it invests and covers these fragments so that only malachite and azurite are visible. The beds are from 3 to 10 feet or more in thickness, and although seemingly solid carbonate of copper, rarely contain over 12 or 15 per cent of that metal. Some portions of the conglomerates are much more highly charged with copper than others, and in places the beds are almost without copper. If a lump of the coarse sandstone charged with the copper ore is digested in acid the carbonate of copper is rapidly dissolved out and the mass falls asunder in loose grains of sand.

In the bed of the little dry wash there are many bowlders, from a few inches in diameter to one or two feet, which are completely covered with a crust of azurite. If there are cracks and cavities in the bowlders the copper carbonate will be found inside or below the surface, but is mostly upon the surface as a thin covering.

These copper depositions are clearly the result of the gradual percolation of copper solutions passing through the porous sand rock, and the copper carbonate is a

deposit of incrustation, not of replacement, for so far as the sandstones and the conglomerates have influenced the deposition, the action appears to be mechanical rather than chemical. The surface, rather than the chemical composition of the strata, appears to have determined the deposition. Nor does it appear that the copper carbonate has replaced any calcareous or siliceous cement. The absence of a cementing material seems to have favored the infiltration and distribution of the cupriferous solution, which may have been gradually concentrated by evaporation, on the surface of the coarse grains of rock. Assuming what is very probable, that the copper was carried in as a dilute sulphate, it would be thrown down as carbonate on meeting carbonate waters or meeting water or moisture in the rocks more or less charged with carbonate of soda. Sulphate of soda would be formed and flow away to be perhaps concentrated by evaporation at some distant point and form beds of thenardite, a mineral which is abundant in Arizona. These deposits of copper carbonate, covering, as has been observed, about 40 acres, contain in the aggregate a very large amount of copper. The question of the source of such extensive depositions of copper at once arises.

The granite below the cupriferous beds and throughout the copper area is very much decomposed and softened, so that it may be cut with a pick or shovel. Considerable areas of granite surface are exposed, and are not covered by sandstone. There are numerous veinlets and thin seams of red oxide of copper, accompanied with malachite, and malachite also occurs disseminated in small nodular or concretionary masses, not much larger than kernels of corn, in the soft ferruginous clay resulting from the decay of the granite. These little button-like disks of malachite are so abundant that they could be washed out with profit if water could be carried upon the ground.

There are also considerable quantities of red oxide of copper in thin sheets, with malachite on each side. These are chiefly broken out from numerous small veinlets traversing the granite. The red oxide is in the middle and the malachite on each side next to the granite walls, the small infiltrated sheets of ore being seldom more than an inch in thickness and commonly not over half an inch thick. In some places fragments of such veinlets are very numerous, having been weathered out by the washing away of the softened granite, but no extensive nor heavy deposits have been found to justify sinking or mining upon. Several drifts and tunnels have, however, been run into the face of the granite hill following some of the veinlets of the copper ore, but the results have not been satisfactory.

Some of the small veins consist partially of quartz, this being the veinstone impregnated with malachite. These appear to have originated since the softening of the granite, and are probably the result of its partial decomposition.

In one of the principal tunnels, which has passed through the decayed portion of the granite and penetrated the unchanged interior portions, sulphurets of iron and copper are found in small bunches and seams irregularly distributed. The quantity is not large—not enough to justify mining—yet in the aggregate the amount of cupriferous sulphide is probably sufficient to be the source of the oxidized superficial ores. Further evidence of the very general impregnation of the granite with copper sulphides was found in the shaft sunk near the bed of the creek to obtain water. Yellow copper ore is found there in small but solid masses in the midst of the hard gray unchanged granite.

I do not attempt an explanation of the source nor origin of the chalcopyrite in the granite. Any satisfactory explanation would have a wide application. There is no evident relation of the sulphides to the porphyry dikes, nor, so far as is observed, is there any pyrites in these plutonic rocks. This is, however, a matter for investigation.

All the observed phenomena point to the disseminated yellow copper ore as the source of the superficial copper deposits and as the principal factor in the alteration of the granite. It would appear that the soluble sulphates of iron and copper formed by the oxidation of the copper pyrites and carried by endosmotic percolation through the substance of the rock have acted upon the feldspar, promoting their decomposition with the separation of silica and the alkalies, the deposition of the copper as oxide and carbonate, the formation of alums and probably also of sulphate of soda, which, flowing away, may have concentrated beyond. The formation of the extensive deposits of copper carbonates may also have been brought about by carbonated surface waters more or less impregnated, as is not uncommon in those dry regions, with carbonate of soda. That soluble silica is one of the products we know, from the fact that in a little trickling stream of water flowing from a spring in the decayed granite there was an abundant separation of gelatinous silica colored green by copper. In this abundance of silica separated from the granite we find an explanation of the origin of many of the little veins of quartz-carrying copper ore and another fact in evidence of the origin of quartz veins generally.

Thus the granite becomes softened in place and "rotted" as deeply as surface waters and air can penetrate, the sulphides disappear, silica and the alkalies are removed, and a ferruginous claylike mass is left with disseminated accretions of copper carbonate and the formation of quartz veins.

An extended chemical investigation is necessary to determine all the conditions which exist before the exact order of interchange of elements can be stated with confidence. These Copper Basin deposits of copper ore in sandstone and conglomerate are very different from those found in the Triassic shales of New Jersey and of Germany and of other countries where the ore is disseminated in grains or patches and in the mass of the rock. In the Copper Basin deposits the ore is spread continuously through the mass and invests the grains of rock, forming a coating. The ore does not in any case appear to have been deposited by reason of the presence of any organic remains, as, for example, the stems of plants such as are found in the sandstone of northern Texas or in Russia. Murchison has described cupriferous grits, sandstones, and shale developed at the Zavods of Yugofski and Matovilika, where the ores of copper, chiefly the green carbonate, are disseminated, and are in the form of cupriferous concretions, generally the carbonized stems of plants. (Russia and Europe in the Urals, p. 144.) Not only Murchison but Maynard has described the deposition of copper on organic remains in the copper sandstone of the Urals. (Trans., IX, 33.) These Arizona beds differ from the cupriferous Permian strata not only in the form of the copper deposition but in their much more modern and local nature.

The copper deposits of northern Texas are familiar examples of the deposition of copper ore on the remains of plants.

Wendt has mentioned the copper of Copper Basin as "carbonate ore which must be of secondary origin" (Trans., XV, 74), but otherwise it has not been noticed in our transactions. He considers the red oxide of the Santa Rita copper mines of New Mexico as derived from the native copper by alteration. (Copper Ores of the Southwest, Trans., XV, 27.)

The explanation of the origin of the Copper Basin herein given will apply particularly to the conglomerate deposits accompanied by extensive kaolinization of the crystalline rocks.

This Copper Basin ore is not a "smelting ore." The bulk of its substance is not sufficiently fusible. Its origin by infiltration suggests the nature of the process by which the copper should be taken out. It is an ore especially well adapted to leaching. The absence of soluble minerals other than the copper carbonate is a great advantage, while the open granular condition of the rock permits the ready action of a solvent and of subsequent lixiviation.

The conditions at once suggest the following process, which is given in outline merely: (1) The solution of the copper carbonate by dilute sulphuric acid. (2) The extraction of the copper by electrolysis. The conditions favoring this method are numerous, but the greatest is the abundance in the region of auriferous pyrites of the "rebellious sulphurets" for which the gold miners are seeking the cheapest and best method of working. The distance over which these sulphurets must now be transported entails a heavy expenditure. The establishment of sulphuric-acid works at Copper Basin would make a home market for the sulphurets, and while the sulphur is utilized for making acid the oxidized residues holding the gold could be chlorinated. Thus the sulphide ores, on the one hand, and the clean carbonates of copper, on the other, although difficult to utilize separately, would by combination give us the precious metals and the copper in a marketable form at a comparatively low cost, and the problem of working both is solved. The spent residue of iron oxide might also be utilized (provided there was rail transportation) at lead-smelting works. There are several economies by such process which will suggest themselves. No greater supply of water is required. The acid need not be concentrated; "chamber acid" would be strong enough. It is possible, also, that no great quantity of acid would be needed, for when the bath is once formed it is probable that the copper ore itself may be made the anode and yield its copper to the solution direct. Pine wood for fuel is abundant on the adjoining mountains, and dynamos can be run very cheaply.

Our fellow-member, Prof. G. W. Maynard, some years ago put up a plant in Siberia for the treatment of copper-carbonate conglomerate ore by lixiviation with sulphuric acid, and has promised to contribute to the transactions of the institute an account of the plan and its results in practice.

THE MARICOPA COPPER MINES COMPANY.

The mines of this company are situated in Maricopa County, 32 miles southwest of Wickenburg and 16 miles in the same direction from the Old Vulture gold

mine. The property has always been known as the Osborne copper mines. William Osborne located them twenty years ago and has held them ever since up to the time the present company bonded them. Very little work has been done until the present active development. A vertical shaft has been sunk 126 feet deep, and is to be extended to a depth of 500 or 600 feet, or until sulphide base is reached. The main dike of this group courses through the country very prominently and ranges in height from a few feet to 75 feet, and a width from 150 feet to 200 feet. Along all this dike are seams of fine carbonate copper ore, and is in a series of a few inches to 7 feet wide. The value is from 14 to 35 per cent copper, with values in silver and gold. Open cuts have been made all along the course of the dike, exposing fine deposits of azurite and malachite carbonate ores. The present shaft is all in this class of ore. The main dike is a formation of porphyritic lime strongly charged with a red oxide of iron. On the west of the dike, running at right angles, is a dioritic slate; on the east, a metamorphic limestone. The original locations consisted of 15 claims. The company now own about 40.

COPPER MOUNTAINS, YAVAPAI COUNTY.

This property, opened several years ago by the Stoddard Copper Company, which has lain idle for a long time, is to be reopened and worked. A recent discovery of a large mass of sulphide ore is reported. A great deal of development has been done in 1898-99, and the showing made is said to be very good.

ARGENTIFEROUS LEAD AND SILVER MINES.

Under this caption are included the claims and mines producing galena ores or lead carbonates—ores of lead and ores of lead containing silver—as well as the mines producing silver ores proper. Considering the fact that some of the most important mines produce gold as well as silver, the two metals being united in the ore, it is difficult to decide under which caption to place the descriptions. This is especially the case with such properties as the Commonwealth and the new discovery at Fresnal, where free gold accompanies silver ore, as in the Comstock lode in Nevada. There can not be any question about the Silver King of Arizona, one of the very few mines which yields silver without gold.

Galena—the sulphide of lead or galenite of the mineralogists and the most common and abundant ore of lead—is well known in Arizona, where it is abundantly distributed, and is generally accompanied by both silver and gold. The chief localities where it occurs in commercial quantity are the Castle Dome district, Silver district, Eureka district, in Yuma County, at several localities in Mohave County, and in Yavapai County.

In Pinal County lead ores carrying silver occur in many places, especially in the old Montezuma mine, between Phœnix and the Hassayampa, and in the Mineral Hill district. At times large bunches of lead ore are found in the Mammoth mine, Pinal County.

In Pima County lead ores occur in quantity at Crittenden, at the Washington camp, at the Vekol, in the Quijotas, the Silver Bill district, the Abbe Waterman mine, and other places. Ores have been shipped also from Greaterville and from the old Yuma mine near Tucson.

In Cochise County there are several localities, notably the Dunn mine, in the Chiricahuas, and at the several claims near Cochises Head.

GALENA AND GOLD.

It is worthy of note that galenite as an associate of native gold is more common and abundant in the auriferous quartz veins of Arizona than in the gold-bearing veins of California. At the Vulture mine, for example, galena is a common associate of the gold, together with iron pyrites; so, also, at the Mammoth Gold mine, at the Oro Bello and the Oro Fino claims, and at many other of the pyritic gold mines in the Bradshaw Mountains, amongst which Ryland mine may be mentioned, and the mines along Slate Creek and the Upper Hassayampa.

LEAD AND MOLYBDENUM.

The very frequent occurrence of these two elements in close association in the lead-bearing veins of Arizona is a familiar fact to the miners and prospectors. It may be said that the molybdate of lead, the species wulfenite, is always found in notable quantities wherever galenite has undergone chemical change, with the formation of oxides and carbonates. Some prospectors have called it yellow lead

ore. It occurs generally in bunches of thin tabular yellow crystals. The intimate association and the general occurrence of wulfenite with the lead ores justifies the opinion that there is an intimate intercrystallization of the sulphide of lead and the sulphide of molybdenum, though molybdate sulphide is generally supposed to be hexagonal in crystallization.

AURIFEROUS CARBONATES.

At many of the lead mines of the Territory, notably some in Mineral Hill district, there are large superficial accumulations of nearly clean lead carbonates which yield notable amounts of gold. Such ores are very desirable for smelting-mixtures. (See Crown Point Group *infra*).

CASTLE DOME DISTRICT.

The veins of the Castle Dome district may be said to have been rediscovered in 1863, for it was evident that they had been anciently worked, as already stated in the historical introduction. The metal had been taken out from many of the veins by the ancient miners down to a depth of from 6 to 15 feet and in continuous lines or trenches, in some places for 50 to 100 feet or more. These old workings were found to be safe guides to good metal-bearing ground a short distance deeper. Well-worn trails leading off from these pits to the banks of the Gila River, some 18 miles distant, and the ruins there of some rude smelting furnaces indicate that the ores were carried to the Gila, probably on the backs of Indians, and that they were smelted there, whether by the Aztecs or the early arriving Spanish explorer is not known. Since 1863 these mines have been worked almost continuously, and are now yielding silver-lead ore of most excellent quality, which is shipped to San Francisco. The claims were worked by prospectors without capital until October, 1870. Up to January 1, 1892, there had not been an investment of over $300 in building or permanent improvements. The climate is such that men can work the year round without more protection than is afforded by brush, huts, or tents.

On the 1st day of January, 1872, Mr. George Tyny reported the following-named claims as producing in 1871:

	Tons.
Buckeye	250
Hora Temple	400
Castle Dome	600
Castle Dome Extension	
Don Santiago	80

The veins crop out on a rolling plain or mesa at the base of the Castle Dome Range, a very rugged and picturesque group of mountains trending northwest and southeast, rising near the center to the remarkable dome-shaped summit with precipitous sides, looking like a huge round castle or building with a dome. It is a noted landmark, being visible from a great distance in all directions. It was originally called "Capitol Dome" by the officers at Yuma in 1853, from the fancied resemblance to the Dome of the Capitol at Washington. This mountain range, being but sparingly watered, has never been convenient to prospect and very little is yet known of its structure or mineral value. The mines are usually reached from Yuma by driving first to the Castle Dome Landing, on the river, and thence to the mine from 16 to 18 miles east and inland from the river. The claims are numerous. Some have been patented and worked to a depth of 300 feet or more. The veins are remarkably regular and well formed. The ore is galena, carrying about 30 ounces of silver to each ton. The veins trend in a general northwest and southeast course, and are nearly vertical. The outcrops are indicated by outlying masses and weather-worn crystals of fluorspar, which is the chief veinstone. Calcite and gypsum are also found, and in some of the veins there is a veinstone of quartz dispersed in sheets or "combs" along the walls or in distinct sheets in the center. Manganese spar and barite are also associated in layers. The thickness or power of these veins is usually from 2 to 3 feet, sometimes from 8 to 12 feet, wide. There are veins also only a few inches in width. In general the veins are well filled with ore. This ore occurs in sheets or bunches scattered through the veinstone and commonly known among the miners as ball metal. In one mine in the district a mass of nearly solid ore 8 feet thick was found.

At or near the water level, where the galenite has decomposed, both carbonate and sulphate of lead are found associated with a pale-green fluorite and an abundance of crystallized yellow wulfenite, another occurrence giving evidence of the presence of molybdenum in galenite.

The rocks of the district are compact fine-grained mica and clay slates standing nearly on edge and traversed by numerous dikes or intrusive masses of a chocolate-colored porphyry.

In 1879 a company was formed to work these veins and smelt the ore at Melrose, opposite San Francisco. This company acquired title to 21 claims in Castle Dome and to 3 claims in Silver district. Among these claims the principal ones worked were the Railroad, the Hopkins, Flora Temple, and William Penn. Large shipments were made to the works at Melrose, averaging generally 60 to 70 per cent of lead and 20 to 30 ounces silver per ton. An average for the first six months of the year 1879 was (on 438½ tons), lead 69 per cent and silver 26.47 ounces per ton. Notwithstanding the favorable value of these ores and the facilities of mining and transportation, the enterprise was a failure. This was caused chiefly by the lack of adequate capital, necessitating borrowing to keep the smelting works going and to carry a large amount of ore and bullion in the course of smelting and refining. The lead produced from the Castle Dome ores is very soft and is especially well suited to corroding for the production of white lead.

SILVER DISTRICT.

This district abuts upon the Colorado River and is about 20 miles above Castle Dome landing. It is remarkable for the great size of the veins, especially of the Silver Glance, which has enormous quartz croppings covering a breadth of 100 feet and carries galenite and chloride of silver in seams through its mass. It has not been much explored. Masses of "float" galena weighing several pounds were found by me just below the outcrop.

The Red Cloud claim yielded a large amount of lead ore for shipment, and is well known among mineral collectors for the fine large crystals of red wulfenite found in the ores.

The Hamburg, the Princess, and the Ironside are other important claims. Ore from the Hamburg mined by the Castle Dome Company yielded from 40 to 80 per cent of lead and from 150 to 306 ounces silver per ton. Beautiful crystallizations of red wulfenite and of vanadinite are obtained at these mines.

PLANCHES DE LA PLATA.

There has been and there still is a difference of opinion as to the exact location of the source of the celebrated large masses of native silver taken from the earth near to the present international boundary line, but on the Mexican or Sonora side, nearly south of Tucson. The celebrity of the locality as the source of enormous masses of pure native silver, larger than could be loaded upon mules, dates from before the middle of the eighteenth century, for a royal decree dated in 1741 not only mentions the weight of some of these masses, but reserves the region for the exclusive use of the Crown. According to Ward, he had in his possession a copy of the decree of Philip the Fifth, dated Aranjuez, May 28, 1741, the object of which was to terminate a prosecution instituted by the royal fiscal agent against the discoverers of Arizona for having defrauded the treasury of the duties payable upon the masses of pure silver found there. The decree states the weights of of the walls, sheets, and other pieces of silver discovered (bolas, planches y otras piezas de plata) to have amounted to 165 arrobas 8 pounds, in all 4,033 pounds, and mentions particularly one mass of pure silver weighing 108 arrobas (2,700 pousnd) and another of 11 arrobas, upon which duties had been actually paid by a Don Domingo Azmendi, and which, as a great natural curiosity (como cosa especial), the King states ought to have been sent to Madrid. The decree ends by declaring the district of Arizona to be royal property, as a "criadero de plata" (a place where by some natural process silver was created), and by directing it to be worked upon the royal account. This put a stop to the enterprise of individuals, the district was deserted, an attempt to send a colony there failed, and in a few years the very name of Arizona was forgotten (Ward's Mexico, 1st ed., vol. 11, pp. 136–138).

The following is taken from an interesting description of the Planchas district from the pen of F. B. L., dated at Nogales, June 15, 1891, and published in the Citizen. This writer places the Planchas locality at about 20 miles southwest of Nogales:

"This is one of the oldest as well as one of the most famous mineral regions of Mexico, and is unique in history as having furnished the largest nugget of native silver ever discovered in the world, its weight being 2,700 pounds. This discovery was made in 1736, causing tremendous excitement and a great 'rush' to the new diggings. Such masses of pure silver as were unearthed in the Planchas Canyon

was the wonder of that day, and have never been equaled since. Numerous specimens of native silver weighing from 200 to 400 pounds were picked up here in those early days, and there is only conjecture as to the quantity of this metal which has been added to the stock of the world from the Planchas district; but there is good foundation for the presumption that it would aggregate many millions of dollars. The old shafts and workings of more than a century ago and of more recent dates to be seen in this locality afford abundant proof of the extensive operations carried on by the early Mexicans. Even as late as about 1870, according to Francisco Maraquin, chief of the Planchas de Plata customs, whom I met here, a piece of native silver weighing 40 pounds was found in the Planchas Canyon and sold to Monte Verte, administrator of Hermosillo mint, Sonora, and still later the better known discovery of the silver hatchet in 1886 by a Mexican cowboy, which was sold to Charles Altschul, of Nogales, for $111, serve to confirm the traditions handed down to us concerning the marvelous discoveries of early times, and furthermore would tend to justify the prediction of an immense ledge of this treasure somewhere in the district as well as warrant the large expenditure now being made by the Plata Reina de Sapora M. & M. Co., under the superintendence of Col. Richard A. Pomeroy, in the projection of tunnels far beneath the old workings. All indications go to show that the early workings with these mines was on the surface. When the ore showed indications of 'pinching out' work was suspended and again resumed in a new place. This method gave rise to belief that the ore attained no depth, that the deposits were merely surface. It is to be regretted that others besides the Mexican gambusinos have pursued a similar policy. Colonel Pomeroy has broken 1,500 feet of ground since December, 1890, and has demonstrated that each of the six claims owned by the company is a lode, and that the most favorable results may be attained by deep mining.

"The ores of these mines consist principally of black silver. The company is now, very wisely, doing no milling, but pursuing a systematic method of development, and will soon be in a position to ship quantities of ore, and will have abundance to treat on the ground. A brief description of these mines might prove of interest to readers of the Citizen.

"In the Ladera mine the method of working was entirely surface and much waste rock had to be removed to obtain the ore. The new tunnel being driven will cut 100 feet below the old workings, where it is expected to strike the ledge. As these ore shoots are encountered they may be followed, leaving the pillars of nonmineral-bearing rock standing. The rock in the breast of the tunnel indicates close proximity to ore, all running something in silver. It is estimated there are 10,000 tons of mineralized rock on the dump worth $11 per ton. First-class ore of this mine averages from 40 to 100 ounces.

"The Hilo mine, the oldest in the district, was worked more systematically in the past than others of the group. A well-defined vein is exposed which dips into the mountain. A crosscut of the tunnel at 50 feet cuts the lode in a good body of ore. Work is now being prosecuted with vigor to get under the old workings, from which large quantities of ore were formerly taken. The vein has been prospected in an entirely new place and shows extremely well.

"The Guadalupe mine, like the Ladera, was worked formerly by a large surface cut, from which great quantities of ore were taken. The tunnel now being run to get beneath the old workings gives good indications to soon be in ore. Another tunnel being constructed is producing small quantities of rich ore.

"In the Mexica mine some years ago a crosscut tunnel over 300 feet long was run under the old workings. A body of rich ore was encountered and stoped out. From this tunnel a level has lately been run east and west. In the east level rich shipping ore has been found; thence a 35-foot shaft sink shows a pay streak nearly all the way down. Ore from the west level assays from 80 to 300 ounces. East level for 100 feet penetrates a mass of fine concentrating ore with bunches of good shipping ore.

"The Providencia mine is being worked by two shafts, and a tunnel on the vein is started. Shaft No. 2 shows a breast of 17 feet of pay streak."

The writer adds that a topographical survey was in progress by Lieut. H. O. Flipper, and a photographic survey by Mr. H. M. Stanley.

SILVER KING.

In 1896 there was a revival of mining of this celebrated property, which is reported to have produced several millions of ounces of silver, and to have paid out over $2,000,000 in dividends. But the renewed prosperity of 1896 was not of long duration. The production has declined. It is more than probable that the ore body, which is so suddenly and sharply cut off at the seventh level, is a slide or mass broken from the main body or chimney of ore which has been moved. The

extent of the slide or faulted ground is not known, and can be ascertained only by the most patient, thorough, and skillful geological investigation. That there has been such a slide, and that somewhere in the mountain the downward prolongation of the Silver King ore ground exists, I have no doubt. The direction of the movement should have been most carefully noted on the rocky floor of the 700-foot level where the richest body of silver ore found in the property rested upon a barren rock floor, below which costly borings with the diamond drill from the adjoining shaft failed to find any trace of the Silver King lode. It seems probable that this problem will be left to the next generation to solve.

SILVER OF GLOBE DISTRICT.

The limestone which forms the hanging wall for the veins of copper is said to be some 6,000 feet thick, and is the foot wall of many of the old worked-out silver mines, such as the Alive, the Miami, Centralia, Dime, and several others, all of which have produced from $30,000 to $20,000 in silver. The silver country proper, however, is situated some 13 miles from the town of Globe. Here we find the old workings of the McMorris, Stonewall Jackson, Rescue, and Old Mexican, etc., which in early days proved bonanzas to their owners.

The country is essentially a limestone country, the silver being found in pockets usually small, but wonderfully rich. These pockets are mostly found under quartzite caps carrying red hematite. The silver is found as chloride mixed with huge masses of native silver, and has carbonates, some embolite, and vadaninite mixed with it. The whole mass is usually associated with hematite, and is invariably free from gold.

The history of these mines shows that they contained from three to seven of these pockets. In one case—that of the Old Mexican mine—only one pocket was found; this, however, netted the owners $168,000 in value of silver. In the report for 1896 and 1897, a photogravure showed the form of one of the silver nuggets found 12 miles north of Globe in August, 1895, which weighed 31 pounds and was 0.900 fine.

TOMBSTONE.

Most of the mines at Tombstone are now idle, and the town is almost deserted. It is interesting to note that ore has been traced from the old claims of the Toughnut and Goodenough through the Way Up down into the Empire claim, and that at present the most promising field for prospecting and working lies in the region beyond the Empire, where, in fact, some ore is being taken out. A rich strike was reported in the Wedge.

The older and larger mines at Tombstone, such as the Contention, the Grand Central, and Way Up, which have yielded so generously in the past of gold and silver, are not now worked for account of the companies owning them, but there has been considerable chloriding in a small way. The dumps also have been partially worked over by the cyanide process. A large portion of the semi-decomposed porphyry thrown out from the Contention mine carried free gold in it, flakes spread in little specks and patches upon the cleavage joints and surfaces. Some of this porphyry in the upper levels was also more or less coated and impregnated by chloride of silver, occasionally in distinct but small cubical crystals. Such rock, if not too clayey and impervious for free leaching, should yield good results by the cyanide process. The great drawback to the working of these Tombstone mines in depth is the great influx of water and the cost of lowering it by pumping. The connection of the deposit or veins under ground is such that one claim can not be drained without draining the others. It therefore becomes essential to have a union of the interests of the various owners and a pro rata agreement to bear the cost of pumping from a central station.

SILVER HILL MINING DISTRICT.

The Liberty mine, worked by William Clark, has been a steady producer of argentiferous lead ore of high grade, and Mr. Clark has made re gular shipment to the smelter. The ore is carefully sorted out to a high grade by hand. It often runs from $400 to $600 per ton. Dr. Purcell has a mine named the Wind Up in the same district, about a mile from Liberty Clark's mine, which is being developed.

VEKOL.

This famous mine, which has yielded quantities of very rich silver ore, has been reopened. In February, 1898, there were about 25 men at work upon it, under the direction of P. B. McCabe. Fine specimens of ore from this property were sent to the Chicago Exposition and are now in the museum of the university.

EMPIRE SMELTING COMPANY, CRITTENDON.

Under the general management of Dr. Eames, of New York, extensive preparations were made for opening mines and smelting silver lead ores at this camp. It was understood that one or two 100-ton furnaces would be required to meet the capacity of the mines. In September, 1897, Mr. Richard Eames, jr., the superintendent of the Columbia Smelting Company, was in Tucson, and reported that the smelting furnace, after a temporary closing down, was again in successful operation, and was turning out three carloads of silver lead bullion per week. They were working on ore from the Hardshell. The condition of the road was such as to render it difficult to get sufficient ore to the furnace to keep it running. Since then operations have been suspended or abandoned.

GALENA IN THE SIERRITAS.

There are several localities from which a galena of low grade in silver can be obtained in the Sierritas south of Tucson. A sample from one claim about 35 miles south of the city yielded 42 ounces of silver by assay.

HEINTZELMAN MINE.

This property, prominent in the early history of mining development under American domination, attracted great attention about 1857. It was acquired and worked by the Sonora Exploring and Mining Company, of which Col. Charles D. Poston was general manager. This mine was in the Cerro Colorado, and very rich ores having been found at or near the surface attention was specially directed to it, and the other localities secured for that company in the Santa Rita and San Cayetano mountains were for the time neglected or abandoned.

In August, 1857, the Heintzelman vein had been opened to a depth of 50 feet, and a pile of ore estimated by assay to be worth $20,000 had been thrown out. Samples of the ore sent to New York and San Francisco for assay gave results confirming those made at the mine. Assays made at the United States assay office by Prof. John Torrey showed silver at the rate of 237 ounces to the ton and 33 per cent of copper. Samples were also examined by Dr. Charles T. Jackson, of Boston, with similar results. Dr. Jackson regarded this ore as stromeyerite, or sulphuret of silver and copper. Some of the specimens contained nitreous copper. This was the first determination of the occurrence of stromeyerite in Arizona. It occurs also, as I have shown, in the Silver King mine. Mr. Brunckow in 1857 reported the occurrence, also at the Heintzelman mine, of fine specimens of the iodide and bromide of silver and a silver amalgam.

Considerable shipments of Heintzelman ore were made to a smelter at San Francisco, where the ore was treated in a reverberatory furnace and yielded at the rate of $450 per ton. It was found, however, that a large part of the silver had been lost in the furnace and residues. The poor success in smelting and the great cost of transporting these ores led to the adoption of the barrel amalgamating process—the Zeiberg barrels—for the greater portion of the ores, excluding those portions evidently of more value for smelting. The poorer and clayey ores were reserved for the patio process.

After many delays from the difficulties of transporting and setting up machinery in that isolated region, two barrels, each capable of receiving 1,060 pounds of ore, were set in motion under the superintendence of the late Guido Kustel, the noted metallurgist, who in May, 1859, stated that 35 tons of the ore yielded $5,189.53 in silver, or an average of $148 to the ton. A portion of the ore treated was very poor and better adapted to the patio process.

Mr. Ehrenberg, in one of his reports, explained this result and made the following estimate of the general or average richness of the ore, based upon the results obtained from the commencement of the treatment of the ores at the mine and elsewhere.

According to Mr. Lathrop and the different engineers, the ore extracted from the mine at that time amounted in quantity to 225 tons. Mr. Ehrenberg thought

this a low estimate. It was distributed as follows, and yielded in silver the amounts stated:

	Tons.	Yield.	Total value.
Sent to San Francisco	22	$450	$9,900
Smelted at Cerro Colorado	7	900	6,300
Ore stolen and sold in Sonora	11	900	9,900
Middling quality and poor ore amalgamated	35	148	5,180
On hand at time and works	150	150	22,500
Total	225	.....	53,780

This shows an average of $238.13 per ton, but this was thought too low because of the large loss of silver in the furnace at San Francisco. The ores sent there were the richest and best and were expected to yield some needed working capital. The first bar of silver from these works at Cerro Colorado was produced in March, 1859. The largest bar made weighed 930 ounces, and at $1.28 the ounce was worth $1,200. It is probable that all the calculations of value were based upon the valuation per ounce.

According to Mr. Brunckow, the vein traverses strata of clay slate obliquely and has well-defined walls. The engine shaft was 100 feet deep, and a crosscut at 60 feet from the surface showed the vein to have a width of from 3 to 5 feet. (These data are chiefly from the article on "Silver and copper mining in Arizona." Mining Magazine and Journal of Geology, new series, vol. 1, pp. 5–7, November, 1859.)

Santa Rita Silver Mining Company.

This company was organized in 1858 to work several of the veins of silver ore in the Santa Rita Mountains, discovered by the exploring parties of the Sonora Exploring and Mining Company. These veins and mines included the Salero, Ojero, Asugarero, Bustillo, and others east of the Santa Cruz River. Some of these veins were worked anciently and large amounts of silver were taken out. The Salero was described as a vein some 3 feet in width. An old shaft had been cleared to a depth of 80 feet without reaching the bottom. The Ojero was a mine of high reputation for value among the Mexicans, and was abandoned because of the caving in of one of the walls. The Bustillo was opened to a depth of 25 or 30 feet only. The ores from these claims are chiefly argentiferous galena, and are adapted to smelting rather than milling. One of the veins was said to be traceable by old workings for a quarter of a mile.

PATAGONIA AND OTHER MINES.

In 1859 the Patagonia was being prospected and worked under the direction of Captain Elwell and Mr. Brewor. It was near old Fort Buchanan. The ores are argentiferous galena, yielding from 40 to 80 ounces of silver per ton. The Compadre and French mines in the mine region were being opened by Colonel Titus. Furnaces were erected about 10 miles from the fort. (See Mining Magazine, November, 1859.)

OLD TUMACACORI.

This property, called the Old Mine in 1875, was believed to be the same as the Tumacacori. It was worked at an early period by the Mexicans, before the American occupation, and was reopened in 1875 by Mr. Darrah. He found old drill holes and human skeletons, leading to the belief that the miners were murdered there by the Indians. Rich ore was found in the mine and on the dump. It is about 75 miles southward from Tucson. (McCormick, 1875, Mining Industry, p. 343.)

OLD YUMA MINE.

This old mine is situated on the left side of the Santa Cruz, 2 miles from the water, in the foothills, and about 9 miles from Tucson. It was formerly extensively worked and yielded large quantities of lead ore. It is now idle. Assays of masses of galena left upon the dump show that it is poor in silver. From the

abundance of wulfenite and the large size of the crystals, it is fair to conclude that molybdenum is abundant in the galenite. The claims are easily accessible, and hauling ore to water at the Santa Cruz would not be expensive.

THE QUIJOTOAS.

The mines of the Quijotoa Mountains, which attracted so much attention years gone by, and upon which millions of dollars were expended without adequate returns, are now idle and are practically abandoned. The massive and costly machinery at the mines and mill and the pumping plant in the valley have long been for sale at very low figures. The whole appears to be a monument to ill-advised and misdirected energy.

PECK MINE.

The Peck mine, in the Bradshaw Mountains, has been a large producer of silver, and is credited with a yield of at least a million ounces. This is another of the many mines in the Bradshaws which have suffered or have been practically closed since silver fell so greatly in value. The Del Pascoe is another mine in the same district which was formerly worked to advantage, but which has been idle for many years.

DASON'S.

Location, Yavapai County, south of Prescott. Produces silver ore. A well-defined vein, with regular walls and vein stone. The vein stuff consists of quartz and iron spar, arranged in regular combs or layers, with crystals pointing inward upon the central layer of galenite and brittle silver ore. Native silver has been found in lumps in the gangue. This mine is opened by tunnels, and is credited with the production of over $700,000 in value of silver up to the year 1887.

AMERICAN FLAG GROUP.

The American Flag group of mines was operated in 1881 by Col. J. M. Haskell and Prof. E. H. Cook, of Tucson. These mines are in Old Hat district, in Pinal County, a few miles west of Oracle, and on the northeastern flank of the Santa Catalinas and some 40 miles from Tucson by road. The district was organized about the year 1878. The principal locations in 1881 were known as the American Flag, Pioneer, Wedge, Good Luck, Black Bar, Bullion, and Commonwealth. There were also the Oracle, Mermaid, Summit, and Hoodoo, the four last mentioned being 3½ to 4 miles distant from the first by the new road.

The American Flag claim was opened to a depth of 178 feet, with a drift at a depth of 36 feet to the east and of 90 feet to the west, as shown in the small longitudinal section. The course of this vein is north 40° west, dip easterly about 40°. It is a thin vein in hard syenite and granitic rock. It averages 6 to 8 inches in the lower part of the shaft at and below the water level. At the surface south and east of the shaft the croppings are heavier, being from 2 to 3 feet in some places. In the east drifts the thickness ranges from 3 to 20 inches, and along the west drift it pinches down to a few inches only. The ore carries both gold and silver, but is generally low grade.

At the claim known as the "Bullion," a shaft 102 feet shows a vein of quartz from 3 to 15 inches in thickness and containing some good ore. It has been drifted on 60 feet northwest and 56 feet to the southeast. The Black Bar is supposed to be the prolongation of the Bullion vein. It is a similar vein, but is more broken up.

The Commonwealth is a quartz vein in granite, and is gold bearing. It was opened by a shaft 44 feet deep, following the pitch of the lode. The claim is about a mile from the others, toward the mountain. The vein varies from 18 to 24 inches in thickness and carries a sprinkling of galena.

The Good Luck is on another small quartz vein traversing granite and resembles the quartz of the American Flag.

The Pioneer is on the line of prolongation of the American Flag, and has similar ore. Its direction is north 50° west, its dip easterly at an angle of about 45 degrees. The incline is 80 feet deep, width about 12 inches.

The Wedge claim was located between the Pioneer and the American Flag.

At the Oracle claim there was an incline shaft about 40 feet deep to drifts, one being 54 feet long and the other 18 feet. The vein in places has a thickness of 3 to 4 feet of good-looking ore.

The Mermaid claim has a 6-foot outcrop of hard quartz.

The Summit claim shows some good ore in a vein of quartz some 6 to 8 inches thick. A shaft 70 feet deep shows an easterly dip to the vein. It is claimed that some of this ore showed by assay a value of $80 per ton. The croppings show well at the crossing of the old road.

The Hoodoo claim is upon a small 6 to 12 inch quartz vein in granite.

LEAD ORE IN THE CATALINAS.

Lead ore occurs in another portion of the Catalina range, and has been exploited for several years by Mr. Samuel Ramsdell. It was reported in February, 1898, that he had sold the property to Mr. H. C. Young, of Boston, who would proceed to develop it and to ship ore.

MINERAL HILL.

Many of the mining locations and the veins of this district were visited and examined by me in December, 1881, and the following notes upon the region were made at that time: The locality is about 15 miles west of Florence; the post-office was known as the Cottonwoods, in Pinal County, and was about 12 miles from Picket Post; some 500 or 600 mineral locations were reported as recorded in Florence; the oldest claim had then been occupied about four years; the ledges are large and numerous, and are upon the west side or slope of Mineral Hill Mountain; there are several springs, affording excellent water, and they do not dry up; a well 30 feet deep has 10 feet of water in it; there are five or more springs within a circuit of 3 miles. I was hospitably entertained at the home of Mr. C. D. Henry and his wife, from Vermont.

The Alice is probably the principal vein. It is a boldly cropping lode, standing up 15 to 20 feet or more in places above the wall rocks, and is from 8 to 15 feet thick. It is only one-quarter of a mile from the springs at the Cottonwoods, and is easily accessible. This lode cuts a mica-slate formation in a northwest and southeast direction. It forms a sharp crest to the hill, being of a quartz and harder than slates. It dips easterly at an angle of from 65 to 70 degrees. This vein is very well formed. It has clay gouge or selvage on the foot wall, and this selvage contains rounded masses of hard stone.

The veinstone is lamellar, consisting of layers of quartz and calcite, some of it being black or dark colored and bearing horn silver. It is a silver-bearing lode. It carries argentiferous galena, which, by oxidation, leaves lead carbonates and oxides and the chloride of silver. Toward the north end the lode splits up into several branches, and about midway of the long line of croppings the lode is cut away by a transverse gully or arroyo, thus making two parts or lines of cropping, the southernmost trending north 45° west, and the northernmost part trending north 65° west (magnetic). And near the southern end of the croppings there is a short twist or turn of the walls to the west, and beyond this a strong outcrop of black calcareous spar. A shaft sunk here 66 feet reaches and passes the level of a tunnel below. The vein, where intersected by this tunnel, is from 8 feet to 10 feet thick.

In a winze 34 feet deep, near the black spar, a streak or layer of fine-grained lead ore (steel galena) was exposed, but this ore is poor in silver, running only 7 or 8 ounces to the ton of ore.

Silver ore is found at intervals in the north croppings in the form of silver chloride. The gangue is friable. In places the silver ore is formed in small shot-like globular masses or grains, coated over with a layer of red iron oxide, forming a crust inclosing the cerargyrite. Evidences of the occurrence of embolite and bromyrite were also noted, but were not verified by examination.

Shipments of ore from the Alice vein were made to the Castle Dome Mining and Smelting Company, at Melrose, opposite San Francisco, with the following results:

	Shipments.	Silver.	Lead.
	Pounds.	*Ounces.*	*Per ct.*
Average	14,364	37.2	18
North croppings	894	163.8	3.5
Do	198	80.3	3

About 1 mile south of the Seven Cottonwoods and the Alice another claim has been located, called the Tully.

THE TULLY OR CARBONATE.

This is supposed to be upon the main lode of the Alice in its southward extension. The croppings are bold and in layers of quartz and calcite, like those of the Alice. A medial layer or seam of fluor spar occurs here, and the vein carries galena and lead carbonate derived from the decay of the galena. Silver chloride does not show in the croppings as freely as at the Alice, but there is more lead ore. Proceeding southerly toward the Gila River, over hills of mica slate, we pass the Leroy claim.

LEROY CLAIM.

A hard vein of quartz, about 6 inches thick, in granite. It may be described as a gash vein of no great extent, but it has considerable ore mixed in with the quartz, and is said to have yielded at the rate of $85 in value per ton to Mr. Mosheimer from the croppings. The mica-slate country from this point toward the Gila River changes to granite, and there are several outcrops of copper ore, among them a location called the San Carlos, for a description of which see under the head of Copper.

WEDGE CLAIM.

This claim on a lode of argentiferous lead ore is in the Cholla group of claims, about 5 miles north of the Alice mine. It occurs in the mica-slate group of rocks, which are much plicated, and are filled with quartz, generally in barren veins. It is somewhat like the Alice vein, and is made up of alternate layers of quartz and calc spar, much of this spar being black or brown in color from the presence of manganese and iron. Much of the quartz is crystalline and some is amethystine. There are many open spaces or "vugs," and pseudomorphic impressions or casts of the dog-tooth form of calc spar are common. There is also much rusty iron oxide and ore near the hanging wall of the vein, where the quartz is formed in successive sheets and layers, and carries considerable lead ore in form of galena and carbonate, over a breadth or thickness of 16 to 18 inches. This was observed in the incline shaft at a depth of about 50 feet. Considerable galena ore has been extracted. A sample of 185 pounds yielded by assay at the rate of 66.3 ounces of silver per ton of ore, and 51.5 per cent of lead. The fluor spar occurs here in small cubical crystals with truncated edges—the dodecahedral planes. Some of the quartz crystals are brown and smoky. The ledge is very large. It trends north 32° west, and dips west at an angle of 45 to 50 degrees.

CROWN POINT GROUP.

Under this name are included 21 claims situated about 6 miles north of the Gila River, near Riverside stage station on Mineral Creek, in Pinal County, and about 50 miles north of Picacho station on the Southern Pacific Railroad. These claims are recorded as the Crown Point, Central, Maryland, Wedge, Silver Cloud, Gladstone, Buckeye, Cincinnati, San Francisco, Parnell, Hidden Treasure, Charleston, and others, that are located contiguously for working purposes. These claims are traversed from northeast to southwest by a series of lodes from 2 to 4½ feet in width, with a dip of 45 degrees to the north. The ores are sand carbonates of lead, running by assay high in lead, silver, and gold. The wall rocks are limestone and porphyry. Mr. Frank M. King, from whom this information is obtained, has not sampled the veins, but took average samples of the dumps about the openings.

Crown Point.—This is one of the principal claims of the group and has been opened by several cuts, tunnels, and shafts. Shaft No. 1 is 153 feet deep, cuts through the vein, and shows it to be about 6 feet thick. Water stands 30 feet deep in this shaft. No. 2 shaft, 50 feet west of No. 1, is 52 feet deep, showing a body of carbonate ore 4½ feet thick. There are other openings showing ore, and there are about 400 tons of ore on the dumps, which, the owners claim, will yield 40 per cent of lead and 20 ounces of silver per ton.

Central.—Three small shafts and one open cut. Vein 15 inches wide and about 15 tons of ore on the dump.

Maryland.—Opened by a tunnel showing a vein about 18 inches wide.

Wedge.—Shaft 14 feet deep and shows some ore.

Silver Cloud.—Opened by a tunnel 120 feet long to top of the vein in the Gladstone, and it is estimated that it will reach it within 20 feet.

Gladstone.—Opened by a tunnel 67 feet long, showing a vein about 12 feet thick. A shaft above, 14 feet deep, shows a quantity of ore.

Ores out.—There are over 1,500 tons of ores out on the various dumps. The samples taken by Mr. King yielded as follows:

	Silver.	Gold.	Value, gold.	Lead.
	Ounces.	*Ounces.*		*Per cent.*
Dump No. 2	5.41	0.62	$12.81	52
Dump No. 1	7.90	.39	8.06	55.8
Bottom of 50-foot shaft	4.76	.76	15.71	42.5
Face of tunnel	8.56	1.40	28.94	37.3

This gold value is an important factor. The distance from Globe is stated to be 22 miles by trail and wagon road. There is a mill site in the river. The distance from the Ray copper mine is 4 miles, and to E. F. Kellner's sawmill, where sawed lumber and timber can be had, is 8 miles. Price of lumber delivered at the mine is $17 per thousand.

DUNN MINE.

The Dunn mine, in the Chiricahua Mountains, was worked in the year 1881 by Chicago capital. It is located on the summit, or near it, at the head of the Pinery Creek, about 40 miles east of south of Willcox on the Southern Pacific Railroad, in Cochise County. Mr. E. N. Titcomb was sent out in charge of the property. He erected a smelter a mile west of the mine for smelting the ore from this mine and from other claims in the region. This smelter was taken down some years after and was set up near Tucson. The mine and others near it have of late been shipping ore to the smelters at El Paso by way of Willcox. The ore is argentiferous lead and occurs in limestone near dikes of porphyry and layers of slate.

The mine is now (1899) known as the Hill Top and is owned and worked by Mr. E. J. Hands, San Simon post-office. Shipments made by him of hand-sorted ore gave returns as follows: Lead, 73½ per cent; silver, 36½ ounces per ton. There are now two carloads out (February, 1899) ready for shipment, but the deep snow prevents. A crosscut tunnel has been run in 60 feet, exposing a body of concentrating ore the full extent of which is not yet shown. There are bunches of first-class ore in the midst of this ore of lower grade. Assays made from the croppings gave from 7 to 9 per cent of lead and from 1 to 3 ounces of silver. In the crosscut the average is from 20 to 25 per cent of lead and 6 ounces silver. Some of the best ore gave 69 per cent lead and 18 ounces silver.

GALENA QUEEN.

This claim, under the same ownership, is the extension easterly of the Hill Top, Ore is exposed on this claim in many places and apparently in the form of pipes or chimneys. But little development work has been done on this claim. The deepest pit is about 25 feet, without ore in the bottom, the vein being apparently a cleft filled in with soil, clay, and iron ore. It is only partially explored, and much ore may yet be found here and at other places in the limestone.

GREAT AMERICAN MINE, SWISSHELMS.

The elevations known as the Swisshelms form a spur from the Chiricahua Mountains, projecting westward into Sulphur Spring Valley. They are nearly west from Tombstone. The creek known as White River turns the northern end of this spur and then runs southward into Mexico. The mine is near the northern end of these mountains, a few miles south of Power's ranchio on White Creek, and consists of a great outburst of quartz ramifying in many directions through limestone strata of Carboniferous age, and not far from the contact of the beds with plutonic rocks. There are many open cuts, tunnels, and shafts. A large amount of silver ore has been shipped away to the smelter, but at present the mine is not worked. It has been tested in depth by diamond drills as shown by the parts of cores left on the ground. Ore to the value of $153,000 was extracted and shipped away from September to May, according to Col. William Herring.

MORNING STAR.

This claim, near Arivaca, has been known also as the Tennessee and as the New York, and has been worked at various dates by different parties. The last work

done was by Mr. J. W. Bogan, from whom the following particulars respecting the condition of the mine were obtained (December 21, 1896):

"The shaft is about 65 feet deep, with water in the bottom. There are drifts both ways upon the vein at a depth of 50 feet. The drift southerly is 18 to 20 feet long; the northerly drift is about 40 feet long. The ore exposed by the south drift is low grade, but the ledge is strong and well defined and is about 3 feet wide. The ledge in the bottom of the shaft is about the same width. In the north drift a kidney of ore was struck, near the water level. This ore body was about 30 feet long and 18 feet deep. It was about 3 feet wide in the widest place. From this bunch or mass of ore Mr. Bogan shipped about 8 or 10 tons, and nearly as it came out, without sorting or very little sorting. This ore yielded a little over 300 ounces in silver and some gold. The rest of the ore, not considered rich enough to ship, was worked at the Consolidated Arizona Mill, and yielded some 30 ounces per ton, and some gold. Before Mr. Bogan had this ore worked the mine was worked by Mr. John Weenis. He took out considerable ore and had it worked in the old Arivaca Mill and also shipped some. The results are not known. At the lowest part of the mine water comes in freely and it is necessary to have a pump to sink deeper. The mine had also been worked by Mexicans and prospectors at intervals for some eighteen years before Mr. Bogan worked it. It is not possible to state how much ore has been taken from the claim. Ore has been stoped out from both sides of the old shaft. There formerly was a long trench or open cut along the vein at the surface. This has since been filled in by dumping ore and waste from the shaft."

CONGLOMERATE MINE.

The Conglomerate mine, about 3 miles south of Greaterville, has been worked by John B. Anderson and his associates and has produced a considerable amount of argentiferous lead ore. According to Mr. Anderson this ore carries 75 ounces of silver to the ton and over 70 per cent of lead. The occurrence of this ore is geologically interesting as it is found in the limestone and not far from the contact plane. The large cave in the Conglomerate is only a short distance north of the mine and is supposed to be nearly in the line of the ore, but no ore in place has yet been found in the cave, though some loose masses of galena were found there and are supposed to have been taken in by some of the former occupants.

TOTAL WRECK.

The Total Wreck mine had a brief existence as one of the most promising properties ever discovered in Arizona. It was extensively "boomed" and overestimated. A costly mill was erected and stands to-day as a monument of cupidity and error. It is south of Nail's station. In 1882 Director Burchard reported 50,000 tons of ore in sight. The 20-stamp mill was then about ready to run to turn the ore into bullion. The mine was opened to a depth of 325 feet by the incline shaft, which has a dip of 35 degrees to the south. Drifts have been extended each way. At the 105-foot level, 230 feet of drifting; at the 212-foot, 250 feet of drift. A tunnel 249 feet long had been run into the hill to intersect the vein at the 212-foot level.

RED CLOUD MINE.

The Red Cloud, in Silver district, under development in December, 1898, by H. Pomeroy Griswold, has about 75 tons of high-grade silver-lead ore on the dump and knocked down ready to transport to the smelter.

PAYMASTER.

In December, 1898, according to the Yuma Sun, Attorney Brown and Joe Werninger had 12 men at work on the Paymaster group of silver and lead claims, and ore was being taken out rapidly. A contract has been let for hauling. The nearest railroad station is Glamis, 20 miles from the mines, and the road is good.

ARGENTIFEROUS LEAD, COLORADO RIVER.

About the year 1864 the following-named claims had received considerable attention:

Pichaco.—Opened by a shaft 100 feet deep and a tunnel 100 feet long. Considerable crude ore on the surface.

Scottie.—Lead ores, opened by a shaft 50 feet deep and a tunnel 50 feet long; reported to have taken out 100 tons of ore averaging at the smelter 50 per cent of

lead and 16 ounces of silver to the ton of ore. Smelted with charcoal made from ironwood.

Salazar.—A company was formed and incorporated in California. Opened by a pit or shaft about 100 feet deep. The amount of silver-lead ore extracted was reported in the year 1863 at about 10 tons sent to San Francisco, which proved to be rich in silver and lead. Some ore was smelted at the mines.

Providencia.—In the La Paz district a lode or vein from 10 to 15 inches wide, from which some silver-lead ore had been extracted, opened by a shaft 15 feet deep. (1863.)

ELKHART GROUP.

The property of the Prescott Development Syndicate, Limited, is situated near Chloride, in Mohave County. Chloride is situated 23 miles by wagon road northwest of Kingman, a station on the Atlantic and Pacific Railway of the Santa Fe system. Kingman is 31 hours by rail from San Francisco and 16 hours from Los Angeles. A branch railway extends from the main line to and beyond the town of Chloride. The property is owned in Scotland, and is under the general management of Prof. Theodore B. Comstock, formerly of Tucson. It has recently been examined critically by Prof. George W. Maynard, of New York, from whose report the following details have been compiled.

The Elkhart Group of mines consists of the following-named claims:

Elkhart	feet	600 by 1,500
Elkhart mill site	do	200 by 438
Bullion	do	600 by 1,500
Dunfermlin	do	600 by 1,500
Dunfermline mill site	acres	5
Argyle	feet	600 by 1,500
Victoria	do	600 by 1,500

The chief development work is upon the Elkhart. The vein traversing porphyrytic rock ranges in width generally from 2 to 5 feet. The general course of the lode is north and south. It is opened by one main shaft to a depth of 351 feet, and by four levels and several winzes. It is practically vertical.

The gangue of the vein is quartz and decomposed porphyry. The ore is a mixture of galena and pyrite, with some blende. It carries some gold and silver, but the chief value is in the lead contents. The ore as mined is not rich enough to send direct to the smelter, and is crushed and concentrated, and the concentrates are shipped to the smelter, generally to the El Paso Smelting Company.

For the concentration of the ore a jigging mill has been erected with a capacity of 100 tons of crude ore per day of 24 hours. The jigs consist of one two-compartment jig with screen of one-half inch mesh, and four compartment Harz jigs with screens of graduated size of mesh. The trailings from the upper four jigs pass to a Huntington mill, where they are ground to pass a 24-mesh screen, and are then passed over a Brown sizer to the fifth jig and the Frue vanners.

The mill has been in operation since December 24, 1897, and up to December 24, 1898, it is estimated that not more than 2,000 tons have been passed through it. The water supply is obtained from the mine and is not as large as is desirable. It is pumped up to a tank to the back of the mill from a tank at the 300-foot level, and amounts to a little over 5,000 gallons in 24 hours.

From a series of samples taken from all the levels of the mine by Prof. George W. Maynard in 1899, it appears that the ore contains from 8 per cent to 43 per cent of lead, from 0.16 ounce to 0.50 ounce of gold, and from 3 to 14 ounces of silver per ton of ore.

It is observed, as would be expected, that the gold content of the ore increases with the increase in quantity of the pyrites. In eighteen of the results by assay, where the pyritic has been above 40 per cent, the gold ranged from .19 to .52 ounce—the average being .30 ounce, valued at $6.20. The silver also increases with an increase in the percentage of galena, the range above 50 per cent of galena, being 13 ounces up to 20 ounces.

As the pyrite alone is not valuable enough to ship it is mixed in with the lead concentrates. This mixing is rendered necessary by the high cost of freight and the smelter charges. It is the custom to mix the low-grade concentrates with those of higher grade in order to obtain a product which shall not run below 35 per cent in lead. Silica sulphur and iron are not determined at the mine. According to Dr. Comstock, the general manager of this property, the zinc contents of the ores do not exceed 10 per cent, and presumably rarely reach this figure.

The expenses of haulage from the mine to Kingman are $4, and from Kingman to El Paso the freight is $7, making a total of $11 per ton from the mine to El Paso.

In the computation of smelter returns it is customary to figure as follows: (1) Compute net weight in tons of 2,000 pounds—say 39,900 pounds is 19.95 tons. (2) Estimate gold always at $19 per ounce—say $\frac{4}{10}$ ounce is $7.60. (3) Estimate silver at 95 per cent of New York quotation on day of release (date of settlement)—say quoted 60 cents is .37. (4) Estimate lead at 55 cents per unit on New York quotation (not exchange) of $4.00 per cent; deduct 1 cent for each 5 cents per cent below $4; add 1 cent for each 5 cents above $4.00, say quoted $3.75, 50 cents; 40 per cent, $20. (5) Estimate all iron in excess of silica at 15 cents per unit, say of 19 per cent iron and 3 per cent silica, 16 per cent excess; 16 at 15 cents, $2.40. Gross proceeds per ton, $36.98. If lead contents are 55 per cent, no charge for treatment. If lead contents are above 55 per cent, some premium paid. If lead contents are below 55 per cent the treatment charge 50 cents for each 5 per cent less; thus, 50 per cent lead treatment, 50 cents ton; 45 to 49 per cent lead treatment, $1 ton; 40 to 44 per cent lead treatment, $1.50 ton; 35 to 39.9 per cent lead treatment, $2 ton; 30 to 34.9 per cent lead treatment, $2.50 ton. Below 30 per cent add 50 cents per ton for each 5 per cent less, and also add $2 more per ton as charge for roasting.

In figuring returns the smelter does not include iron in the original gross computation, but deducts the iron bonus from the treatment charge. Sulphur is not regarded except to classify the product. If below 12 per cent the product could be regarded as oxidized.

PRIDE OF THE WEST MINING COMPANY.

In Washington camp in the new county of Santa Cruz, A. R. Wilfley, owner; Emerson Gee, manager, Washington post-office. The ores contain copper, silver, and lead, and have an average value of $30 per ton. Opened by 500 feet of shafting and 1,500 feet of tunneling. A concentrating mill of 100 tons daily capacity is now (June, 1899) building, as also a tramway to convey the ore to the mill. In the first part of the year 5,000 tons of ore were shipped, and 200,000 tons have been blocked out in the mine preparatory to mining and milling when the mill is ready. (From statement of E. Gee, manager, June, 1899.)

HILLSIDE MINE.

This property, also known as the Seven Stars Group, is in Yavapai County, about 50 miles from Garland station on the old Prescott branch of the Atlantic and Pacific Railroad and about 80 miles west of Prescott, is on the head waters of the Santa Maria River. It is now best reached from the Phœnix and Prescott Railroad. The region is elevated about 4,500 feet and salubrious, and is favorable for working at all seasons of the year. Bowlder Creek has here cut its way downward through a mesa of malpais and into a region of slates, syenite, and granite standing nearly on edge. These are ancient rocks and are traversed by the metalliferous vein nearly parallel with the adjacent contact of the slates and granite. The vein is strong, and all the appearances promise permanency and depth and a very uniform mineralization with gold, silver, and lead ore of high value. At the croppings the oxidized ore contained a notable quantity of free gold and ore were mined and shipped away in quantity, the proceeds being to open up and explore other parts of the vein. In the month of July, 1888, the aggregate length of drifts and tunnels was over 2,300 feet and of shafts of over 800 feet. Much more has since been done.

In 1889 the ore-bearing ground, which had been opened continuously, measured about 2,000 feet in length, and the vein had been proved to extend for the whole length of two claims or 3,000 feet.

The property was incorporated under the laws of the State of New Jersey about the year 1892 under the title of the Seven Stars Gold Mining Company, with 600,000 shares, at $5 par value each. A part only of these shares were sold, and a failure to acquire title to the property led to litigation and the stoppage of work. The mine has since been idle. This property will undoubtedly be a great producer as soon as the litigation now pending is ended.

The Peck Mine, of Yavapai County, was one of the most valuable silver mines ever worked in the Territory, and the mines now being worked at White Hills, Mohave County, are producing largely and profitably. The silver mines of Mohave County are very active, especially in the vicinity of Chloride, to which point a railroad has just been constructed.

This county's mineral resources—gold, silver, and copper—are now attracting great attention. Silver mining in the Territory has received a decided impetus during the year, and the products will show a large increase over last year. It is impossible to mention in detail all of the promising silver properties.

ZINC, IRON ORES, MANGANESES, TUNGSTEN.

The ores of iron are abundantly distributed in Arizona, especially the specular or hematite varieties, of which many samples are sent in in the course of the year to the Arizona School of Mines under the supposition that they represent deposits of wolframite. The specular varieties are usually fine grained and in small, shining grains or thin plates. In this form it appears to have been sought for by the aboriginal races for facial adornment as a face powder probably, for it is readily spread over the skin and produces a brilliant effect in the sunshine, as if the skin were covered with small mirrors. It is interesting to note also that this same mineral when finely ground and lenzated gives the blood-red powder known as rouge, with which some persons of the highest type of highest civilization are not unfamiliar.

Large masses of hematite in transported blocks are found in the gulches and arroyos of the western side of the Tucson Mountains. So also the abundance of heavy masses of this ore upon Bill Williams Fork of the Colorado gives evidence of the existence of extensive beds in that region. This occurrence, tending perhaps to show the existence there of the ancient Archæan rocks, was noted by me in 1865 and reported in the American Journal of Science for 1865 and 1868.

Magnetite is also found in considerable quantities in the Tucson Mountains. A mass presented to the Territorial museum by Mr. Samuel Hughes shows polarity.

The hydrous form of iron ore is common in the croppings of veins which contain sulphide of iron, and also in connection with the oxidized form of copper ores, though the copper gossans are often made up largely or wholly of the soft red hematite without water of combination. Such very red gossans mixed in with the green and blue carbonate of copper are sometimes mistaken for the red oxide of copper. Iron ores, especially if convenient to a smelter, are sought for for flux, especially if the ore contains even a trace of gold. Tests of the assay laboratory of the School of Mines, Tucson, show that many of the specular ores are slightly gold bearing.

It does not appear probable that for many years at least the iron ore deposits of Arizona can be economically utilized for the production of iron or steel. The cost of fuel and transportation is too great, and besides, the product would not find an extensive home market. We have only to consider that the enormous beds of both specular ore and magnetite of Iron County, Utah, with coal and limestone in close proximity, lie undeveloped, to conclude that the day is distant when the ores of Arizona shall be sought for to convert into iron.

The large beds of magnetite of Hanover Gulch, in New Mexico, not far from the Arizona line, being connected directly by rail with the great trunk lines, have been worked extensively for ore to be sent to Pueblo and Denver for fluxing purposes. These ores occur in limestone and are generally of high grade and purity, but some of the beds are very siliceous and contain traces of copper and zinc. The analyses of ore from two of the mines are subjoined.

	Hanover mine.	Iron Queen mine.
Iron, metallic	65.571	68.838
Silica	4.930	.850
Phosphorus	.016	.002
Sulphur	.038	.061
Titanic acid	None.	None.

ZINC.

There are no distinctively zinc mines, as such, worked within the limits of Arizona, but zinc ore in the form of sulphide (sphalerite or blende) is a frequent associate of other ores, notably of galena and iron pyrites. It also accompanies ores of copper in the Helvetia and other districts. The massive yellow copper of the Mohawk claim is closely associated with blende in a massive, granular state. At the San Xavier mine it forms an essential part of the bulk of the ore and similarly at other mines in the southern part of the Territory. At the Silver King

mine, Pinal County blende of a beautifully light sea-green color was in close association with the native silver and similarly at the Tiger mine, Yavapai.

MANGANESE.

Several localities of manganese ore have been brought to notice during the year through samples sent to the School of Mines for determination. It is not yet ascertained whether at any of these places the mineral occurs in sufficient quantity or under conditions favorable for commercial utilization. The distance from any market is also so great as to prevent profitable exploitation. Manganese ore can, however, be used as a flux for other ores, notably in place of iron ore in smelting lead.

A manganiferous limestone occurs near Tombstone. It appears by its decomposition to have given rise to deposits of oxide of manganese which are silver bearing. These ores have yielded not less than 750,000 ounces of silver. The limestone belt in which these ores occur has an easterly and westerly trend, is about 1,680 feet wide and rests on granite on the north, the plane of contact being nearly vertical. See paper by Charles W. Goodale on the occurrence and treatment of the argentiferous manganese ores of Tombstone district of Arizona. (Trans. Amer. Int., XVII, p. 767.)

The ores are best developed upon the claims known as the Lucky Can, Lucksine, Knoxville, and Wedge. They occur in chimneys or pipe-like deposits, which dip easterly at an angle of 40 to 50 degrees. Some of these have been developed to a depth of 400 feet. The milling ores contained from 41 to 74 per cent of sesquioxide of manganese. The smelting ore contained nearly 45 per cent of manganese (calculated as metal).

There was some question as to the origin of the manganese oxide. It was my opinion, and still is, that the manganiferous limestone is the source. Some analyses showed less than 1 per cent of manganese in the limestone, but one analysis of the limestone from the west end of the Knoxville claim, made by F. C. Earle, gave 2.85 per cent of carbonate of manganese, a quantity quite sufficient to account for the origin of the deposits.

There is another belt of limestone in the eastern part of Tombstone district, where manganiferous silver ores are found, but not to the same extent or richness in manganese as in the Knoxville belt.

Specimens of massive manganite in rolled, smooth, water-worn masses, compact, dense, and nonmagnetic, occur in the Kenilla Mountains, Pima County. Specimens were sent to the School of Mines for determination by F. Schumacker, Fort Huachuca.

WOLFRAMITE.

The discovery of veins containing the comparatively rare mineral known as wolframite within the limits of the Territory of Arizona, made and reported in 1896 from the Arizona School of Mines, is as follows:

"Deposits of wolframite, a mineral containing tungsten, have been made known as existing in the Arivaca mining district, and if the quantity is sufficient this mineral may add to the useful mineral products of the Territory."

A similar notice appeared in the Engineering and Mining Journal, Vol. LXV, page 608. These deposits consisted of the tungstate of iron and manganese diffused in crystalline grains and bunches in the quartz of gold-bearing veins at Guijas upon properties located by Bent and Sampson as gold-bearing veins.

In May, 1898, the Territorial geologist also reported the discovery of other and more extensive deposits in quartz veins traversing the granitic rocks of the Dragoon Mountains at Russellville, about 6 miles north of Dragoon Summit, on the Southern Pacific Railroad. At both of these localities the mineral occurs in workable quantities sufficient to form the basis of the industry of tungsten mining in the Territory. But the quantity is by no means unlimited, and there is no danger of the supply exceeding the demand, at least not for some time, if the demand continues at the present rate.

The Russellville ores consist for the most part of clean tungstate of manganese with but little or no iron. To this variety of wolframite the name hubnerite has been given. It is equally as valuable as the iron variety and contains as much tungstic acid.

The Russellville veins have been purchased in part by Messrs. Stein & Buericke, of Philadelphia, and in part by the Chrome Steel Company, of Brooklyn, N. Y. Mr. Asa Walker and associates also hold and have worked claims and shipped ores, selected by hand from the outcropping masses and the loose "float" specimens on the croppings.

The two firms above mentioned have made considerable shipments of ore obtained in this way, but the operation was slow, tedious, and expensive and also wasteful, as much of the lower grade material was necessarily left at the mines, being too poor to bear the cost of shipment to New York or Philadelphia. Such material needed concentrating machinery for the separation of the quartz. Messrs. Stein & Buericke therefore sought the aid of the Arizona School of Mines and sent several carloads of the cyanide ore to be experimented with to determine the best form of mill, or the best forms of crushing and concentrating machinery for working this peculiar ore. The experiments, as anticipated, were entirely successful. By the preliminary course, crushing and jigging, the bulk of the coarse-grained hubnerite was separated in the first compartment of the top-discharge jigs, while the fines were best secured in the bottom-discharge jigs of the Hartz pattern, a thick bedding of clean, coarse ore being used on the beds. Both sizes of the product ran very high in tungstic acid—about 70 per cent; while the second grade from the second and third top discharge averaged about 50 per cent. The coarse tailings contain less than 1 per cent. There was, of course, a considerable amount of "chats" quartz, containing some attached ore, which requires recrushing to liberate the wolframite and a subsequent concentration on some form of concentrator, such as the Frue vanner or Wilfley table. The deportment of this wolframite ore under concentration processes is very much like that of tin ore and the methods and appliances in use in Cornwall for cleaning or "duning" tin are applicable in this case. So far, however, the wolframite not being associated with any sulphides or arcenide calcining.

It is known, however, that in one or two wolframite-bearing veins there are portions, in the form of chutes or chimneys where iron pyrites occur accompanied by gold. This is true particularly of the Arivaca veins, where they were originally located as gold-bearing lodes. In such veins the problem is presented of securing the free gold from the surface or oxidized ores and collecting the finely crushed wolframite as a second product, and at one operation. When the lower levels on the veins are reached and the auriferous pyrite presents itself in its original condition, the separation will be more difficult and expensive. Here, however, we may avail of magnetic separation. Samples of the hubnerite sent from the Arizona School of Mines to the Wetherill Separating Company, of New York, have been tested with remarkable results. Under the intense magnetic energy of the Wetherill magnet the tungstate of manganese responds like the tungstate of iron, and may be lifted from pyritic mixtures, for it is found that iron pyrites is comparatively inert and magnetically not affected by magnetism. From the trials so far made it would appear that magnetic separation may be resorted to successfully not only for the mixed ores, but with ores of tungstate in a quartz gangue, especially in localities where water for jig separation is scarce or not obtainable. A good field is also presented in such cases for pneumatic jigs.

In addition to the associated minerals already mentioned in this article and in the communication to the American Institute of Mining Engineers, it should be stated that deeper work on the veins of the Russellville locality has shown increasing amounts of the lime tungstate—scheelite—which is so closely mingled with the quartz gangue of nearly the same color as to escape casual observation.

When the ore was first jigged the constant appearance of white or cream-colored fragments in the midst of the clean black wolframite discharging from the first compartment excited surprise, the white grains being of equal weight with the wolframite and therefore not quartz. On testing the heavy white grains they were found to be tungstate of lime of equal value with the wolframite.

Another mineral associated with the wolframite was found below the surface croppings. This is fluorite, or fluor spar, and in one of the veins is comparatively abundant.

The clean wolframite separated from the quartz by the jigs was dried and sacked as fast as produced, and was shipped by Stein & Buericke to their works in or near Philadelphia, where it is stated it was smelted to a high-grade tungsten metal and was sold to consumers in the United States and abroad.

In addition to the shipments of high-grade concentrates from the mill, the owners of claims at the Dragoon localities have been able to cull many tons of high-grade clean ore from the surface croppings. Masses weighing from 10 to 100 pounds or more have been found with but little attached quartz. This source of clean ore is now practically exhausted, though in mining there is a small amount of massive ore broken out which can be separated by hand.

In regard to prospective quantity of ore and commercial supply, it must be understood that mining, especially upon small veins, is slow and costly. The wolframite occurs in detached bunches, or pockets, here and there, but not in

continuous sheets, and in mining it becomes necessary to drift for considerable distances in the barren portions of the vein and to move much worthless material in order to reach the ore-bearing portions. Thus the costs of mining per ton of clean ore are large and will be an increasing factor as depth is attained. The supply of wolframite will thus necessarily be more restricted when it depends upon deeper mining.

The market price of wolframite appears to be very variable, owing probably to the fact that the demand is variable, as well as the supply. At the time of the discovery at Guijas, Arivaca, only $80 per ton was offered for clean, 70 per cent ore. This figure was not encouraging to those who had to mine, sort out, sack, and ship such high-grade ore. But the offerings at the mines from various sources rapidly advanced to $120, $200, and even as high as $400 per ton for small lots. The demand seemed to be suddenly stimulated.

Mention should be made of a locality at Separ, N. Mex., from which several shipments were made in 1895 and 1896. The ore was the manganiferous variety, of good quality, and was sold for $80 per ton. The locality is regarded as exhausted.

The wolframite or hubnerite, to be commercially available, should be quite free from sulphur or arsenic or any excess of quartz and should contain at least 60 per cent of tungstic acid. The pure mineral contains over 70 per cent. Foreign quotations of value per ton are for long tons of 2,240 pounds, net.

Tungsten is a word of Swedish origin, meaning heavy stone; from tung, heavy, and sten, a stone. It appears to have been applied first to the mineral now called scheelite, named for the distinguished chemist, Scheele.

EFFECTS OF TUNGSTEN ON STEEL.

The useful effect of the addition of small quantities of tungsten to steel has long been known. The famous Damascus sword blades have been found to contain from 0.05 to 0.10 per cent of tungsten, and it has been used to produce damasked steel. According to Crookes & Rohrig, Jacob first produced tungsten steel experimentally on a large scale in 1855. The steel made by him showed an exceedingly fine, conchoidal, silk-like fracture. It combined great hardness and density and was superior in tenacity and wieldability to all others.

The properties of tungsten steel are exhaustively discussed by Howe in his celebrated monograph. He gives not only a general view of the literature of the subject and an account of the results obtained by various investigators, but a statement of his own original experiments with this alloy.

The alloy of the tungsten and iron was first made by the brothers D'Elhuyar in 1873, and later by Berthier and others. Bernouilli, at the Royal Foundry of Berlin, made tungsten steel by melting tunstic acid (WO_3) with turnings of gray cast iron. The carbon in the cast iron in the form of graphite he found would reduce the tunstic anhydride to the metallic state, but the combined carbon alone did not. The iron alloy may be made by heating wolframite or scheelite with iron or iron oxide in a brasqued crucible. It required a long continued and high heat. It has even been made in a blast furnace. At the last International Exhibition at Paris P. E. Martin reported having made ferro-tungsten of 28 per cent in the blast furnace. The tungsten renders the fusion more difficult. It raises the melting point of iron. Tungsten alone is difficult of fusion. It is considered infusible under ordinary conditions. With iron it unites apparently in all proportions up to 80 per cent, but commercially alloys containing more than 40 per cent of tungsten are rarely made. Ferro-tungsten has been reported for sale in the European markets containing from 20 to 50 per cent of tungsten and from 1.5 to 6 per cent of manganese. The 50 per cent alloy is questioned by Professor Howe.

A table analysis of ferro-tungsten given by Howe shows in six different samples from 24.25 per cent to 77.8 per cent of tungsten. The amount of tungsten in tungsten steel is much less, ranging in thirteen samples or analyses from 1.94 per cent to 11.03 per cent, this last being from a steel made by Schneider. An analysis of Mushet's special steel showed 9.99 per cent, and another 7.81 per cent. In the Crescent hardened steel of Pittsburg 6.73 per cent was found.

The useful effect of tungsten upon steel is not only to render it harder, but the steel becomes less liable to lose its tempered hardness under the heating to which tools, especially those used in machines, are liable. The tungsten steels are usually hard enough to scratch quartz. Howe could not detect any increase of hardness or quenching in Mushet's steel. Mushet's steel, the Crescent hardened, and the Imperial steels are used without hardening by quenching, which is regarded as liable to produce cracks. Whether quenched or not their hardness is sufficient to scratch glass, but not quartz. As heat does not draw the hardness, such steels may be used to great advantage for machine tools. Thurston says he has found both

chrome and tungsten steels far more desirable than the carbon steels, with which they compete. On the other hand, the difficulties and peculiarities noted in working them are obstacles which retard their introduction. When the carbon steel can not be made to stand, these peculiar steels are the only metals which can be used for cutting tools. Their great wearing power gives them especial value where gauges or standard sizes of tools are especially desired to retain standard size as long as possible while in use.[1]

Tools made of ordinary tungsten steel according to Thurston may be forged into shape at a red heat, but the harder grades can not be cut with a file and can not be tempered, and after being forged into shape roughly must be ground into the exact form when cool.

Howe states that steel may contain a much larger proportion of tungsten (at least 10 per cent) than of carbon without losing its power of being forged.

Ores of tungsten when occurring together with the sulphides such as pyrites, copper pyrites, and with the arsenides are unsuitable for making ferro-tungsten without careful purification by calcining or roasting. Even after these processes have been carefully completed some noxious residues may remain, enough to impair the quality of steel made from the product. An ore of tungsten absolutely free from such noxious ingredients is therefore of great industrial importance and should be in great demand.

The clean, pure tungstate of manganese of Arizona, without sulphur or arsenic or other noxious elements, would appear to promise unusually good results in the production of a tungsten-manganese steel, combining the qualities of extreme hardness from the tungsten and toughness from the manganese.

The use or tungsten steel is increasing. This was noted by Professor Howe at the late international exhibition. At least six exhibitors displayed tungsten steel. It is recommended by most of them for cutting such hard metals as hardened steel and chilled cast iron. The St. Chamond Company recommends it for springs, claiming that its carrying power for a given size is about one-third greater than that of the best carbon spring steel.

TUNGSTEN AND NICKEL ALLOY.

The magnetism of nickel and tungsten alloys had been studied by John Trowbridge and Samuel Sheldon. (Proceedings of the American Academy of Arts and Sciences, reprinted in the Amer. Jour. Sci. XXXVIII, p. 462.) The investigation was instigated by Mr. Wharton, proprietor of the American Nickel Works. The fact that different kinds of steel alloyed in small portions with tungsten or wolframite and magnetized to saturation increase in specific magnetism, had long been known, and it was desired to ascertain whether similar effects would result from the combination in alloy of tungsten and nickel.

The alloys prepared for the experiments were in two groups. The first consisted of three bars of the same shape, one being of pure nickel, and the other two of nickel containing respectively 3 and 4 per cent of tungsten in alloy. These bars were rolled from cast ingots, toughened by the addition of magnetism after Fleitman's method. These were hot when rolled. The bar of pure nickel was placed into regular shape; but the bars of tungsten alloy were too brittle for this. There was also a bar with 8 per cent of tungsten which was ground into shape.

The second group consisted of simple cast bars without the addition of magnetism. They were of pure nickel and alloy, with 1, 2, 3, and 6 per cent of tungsten. These were all extremely hard and brittle. The results obtained "indicate that tungsten greatly increases the magnetic moment of nickel if the alloy be forged and rolled, but on the other hand has but small influence if the bars are simply cast. And it was also found that changes in the amount of tungsten did not appear to cause corresponding changes in the magnetic properties. The specific magnetism of all the bars were found to be small when compared with good steel magnets.

The experimenters conclude their article with the following statement: "If forged nickel and tungsten can be made to maintain a specific magnetism of 10, it will form a useful addition to the resources of physical laboration. From the high polish from which it is susceptible and its freedom from damaging atmospheric influences, it will be most highly suited for the manipulation of mirror magnets when magnetic damping is to be employed."

STEIN AND BUERICKE GROUP.

This group of tungsten-bearing veins consists of nineteen claims—the Blue Bird, Black Beauty, Dividend, Cracker Jack, Hidden Treasure, Surprise, Last

[1] A treatise on Iron and Steel, fourth edition, p. 270.

Chance, Mayflower, Wolfram, Queen, Gray Warrior, Oregon, Red Bird, Juniper, Aetna, Yankee Pride, King, Little Jessie, Ada—all located in the early part of the year 1898 near Russelville, 6 or 7 miles north of Dragoon Station, on the Southern Pacific Railroad, in Cochise mining district, Cochise County, with the post-office address at Dragoon.

These claims have in whole or in part been acquired by the firm of Messrs. Stein & Buericke, limited, of Philadelphia, which has expended $3,000 or $4,000 in pits, shafts, and tunnels. They have also shipped away several carload lots of hand-selected hubnerite of high grade, besides 100 tons or more for concentration at the experimental mill of the Arizona School of Mines at the University of Tucson. The ore, as elsewhere described, consists of hubnerite and scheelite in quartz.

OTHER LOCALITIES OF TUNGSTEN.

The importance and success of tungsten developments at the Dragoons and at Guijas, have stimulated exploration and search for other places, and several new localities are reported, and samples of good quality have been examined at the School of Mines, among them ore of massive scheelites, but as but little is yet known regarding the quantity and accessibility, descriptions must be deferred. Great quantities of iron are found in Maricopa County, west of Castle Creek.

SODA, SALT, SULPHUR, COAL, ETC.

Large deposits of sulphate of soda, in association with halite (rock salt), occur in the Verde Valley, a few miles south of old Camp Verde. They form large banks and hillocks, slightly discolored by soil and dust. It is the mineral known to mineralogists as "thenardite" and to druggists as "glauber salts." It is a powerful purgative, and has this effect in a marked degree upon the cattle which resort to it. The mineral is quarried out in large blocks and is sold to rancheros and stockmen for their cattle ranges. The salt occurs in crystalline blocks, very clear and pure, in the midst of the thenardite, and is not easily separated from it. Analysis shows that this mineral contains about 53 per cent of sulphuric acid and 43 per cent of soda. The mineral called "glauberite" occurs at this locality, and is sometimes altered to calcite. The crystals are from half an inch to 2 inches or more in length, as shown by me in a paper in the American Journal of Science (1890, pp. 39, 43), which follows:

THENARDITE, MIRABILITE, GLAUBERITE, HALITE, AND ASSOCIATES OF THE VERDE VALLEY, ARIZONA.

The deposits of sulphate of soda of the valley of the Verde River, near the military post of Camp Verde, have long been known and extensively quarried by the rancheros of the region as a substitute for salt for cattle and horses. The occurrence of thenardite in Arizona was first made known to science by the late Prof. B. Silliman in 1881, but he had not visited the locality and it has not been described. A recent visit to the place and a somewhat hurried and superficial examination enabled me, however, to collect and identify other allied species in association with the thenardite and a peculiar pseudomorph of carbonate of lime after glauberite.

The deposits of the thernardite and the associated minerals are of considerable magnitude, covering several acres in extent, and reach a thickness of some 50 or 60 feet or more. They appear as a series of rounded hills with sides covered with a snow-white efflorescence and a greenish-colored and yellow clay at the bottom and top, partially covering the saline beds from view.

These beds are doubtless remnants of a much more extended deposit which occupied a local lake-like depression or basin, probably at the close of the great volcanic era, during which most of the mountain valleys of central Arizona were filled up by sediment and then overlaid by successive streams of lava. Sedimentary beds of volcanic origin remain throughout the Verde Valley and its chief tributaries, and in the region of Camp Verde are deeply eroded, but rest on the uneven floor of ancient pre-Silurian slates standing on edge. High above the deposits of the valley vertical cliffs of hard lava mark the edges of extended mesas of malpais, under which all the other formations are hidden and protected. But the excavations in the banks of the sulphate of soda are insignificant in comparison with the magnitude of the beds, and have failed to show conclusively any bottom or top or to reveal the true relations of the beds to the surrounding formations. Whether or not they are members of the volcanic series of a later and more local origin is yet uncertain.

THENARDITE.

This salt constitutes the bulk of the deposits. It is a coarsely crystalline mass, so compact and firm that it can be broken out only by drilling and blasting powder. It varies in its purity. Some portions are more or less contaminated with a greenish-colored clay, but it is obtained also in large masses, nearly colorless and transparent, with a slight yellowish tint, but seldom showing crystalline forms.

MIRABILITE.

The hydrous sulphate of soda occurs in close association with the thenardite and appears to penetrate its mass in veins, but may prove to be an overlying bed. It is this species which, by its rapid efflorescence when exposed to the air, covers the whole deposit with a white powder and a thick crust through which the quarrymen must cut before they reach the solid banks of the anhydrous sulphate.

HALITE.

Rock salt, in beautifully transparent masses, is sparingly disseminated in portions of the great beds. These crystalline masses, so far as observed, do not exceed an inch or two in thickness, and no evidence of the existence of any separate workable beds could be seen. It is irregularly disseminated in the sulphate. Some masses exhibit beautiful blue tints of color, like those seen in the salt of the Tyrol and of Strassfurt. Good fragments for optical and thermal experiments could be obtained here.

GLAUBERITE.

This anhydrous sulphate of lime and soda is an interesting associate of the other species. It occurs chiefly near what appears to be the base of the deposits, in a compact green clay. It is in clear, transparent, colorless crystals, generally in thin rhombs, lozenge-shaped, with the plane angles of 80 and 100 degrees, and from half an inch to an inch or more broad and one-eighth to one-fourth of an inch in thickness. The prismatic planes (11) are generally nearly obliterated, or are absent, through the great development of the hemi-octahedral planes (7) replacing the obtuse terminal edges. The terminal plane (o), is chiefly developed, and this, with the broad planes replacing the obtuse edges, gives to some of the crystals the appearance of rhombohedrons of the minus series. The general habit of the crystals is similar to those from Westergeln, near Strassfurt, described by Zepharovitch (Sitzungber. Akad. Wien, Vol. LXIX, 1874), and the predominating pyramid on the acute edges has also been noted. There is evidence that the crystals vary greatly in size and in their habit in different parts of the deposits. They occur also in the midst of portions of the solid thenardite as inclusions, and in one instance a small crystal was found in the midst of a transparent mass of halite. Close inspection of the transparent tabular crystals from the green clay reveals the presence of crystalline cavities with fluid inclusions, made evident by the movement of small bubbles. When heated the decrepitation is violent.

CARBONATE OF LIME PSEUDOMORPHS.

Where the lower bed, containing the bulk of the glauberite, crops out at the surface and has become oxidized and dried, the glauberite disappears and is replaced by carbonate of lime in an amorphous condition, but having the exact form of the glauberite crystals whose matrix they have filled. These pseudomorphs are firm, compact, and dense, but are without cleavage or interior crystalline structure. Color, cream yellow. They weather out in great numbers, and show that the glauberite must occur in a great variety of sizes and forms of aggregation, in some places in rosettes and in others in crystals 2 or 3 inches long.

BOURNONITE IN ARIZONA.

Bournonite occurs sparingly at the Boggs mine, in the Big Bug district, Yavapai County, Ariz., associated with pyrite, zinc blende, galenite, and copper pyrites. The crystals are brilliant and characteristic, with interesting modifications not yet studied and compared. This is believed to be the first discovery of this species in the United States. I am indebted to Fred E. Murray, esq., superintendent of the mine, for specimens.

NATIVE SODIUM CARBONATE.

Extensive deposits of a native sodium carbonate in northern Sonora, near to the Arizona line, are known to exist and are under exploration by citizens of Tucson. In the month of February, 1898, an investigation of the nature of this material

statement of the results was printed in the Engineering and Mining Journal of was completed by me in the laboratory of the Arizona School of Mines, and a brief New York February 12, 1898. A résumé of this article is appended:

"The Arizona School of Mines in 1898 completed an investigation of the 'trona,' or crude carbonate of soda, brought in from a deposit near the head of the Gulf of California. It is known as the Santa Helena soda deposit, and has been taken up under the mining laws of Mexico by Messrs Andres and Joseph Rebeil, of Tucson, Ariz.

"The location is the northernmost portion of the State of Sonora, Mexico, in the mining district of Altar, about 2½ miles from Adair Bay, and directly upon the shore of the Gulf. It is thus not far from the international boundary line, and is most directly accessible by water from Yuma or the Colorado, or overland from the Gila Bend station on the Southern Pacific Railroad. The shores of the eastern side of the Gulf at the place are generally low and shelving, and broad areas are left bare at low tide. At this particular point it is claimed that the water is deep enough for vessels of moderate draft to lie safely at anchor, where they can take in cargoes of soda from lighters.

"The soda is found in the central portion of a basin-shaped depression, described as a dry lake about 1 mile in length and 1 mile in breadth. The soda is spread out in a white sheet or layer over an area of some 60 acres, and resembles a mass of snow and ice or the surface of a frozen lake. The few tests that have been made by digging and boring down into this deposit show that it has a thickness varying from 1 to 3 feet, partly overlaid by a stratum of sandy earth some 3 inches thick. The lowest portions of the soda bed are saturated with water, or rather with a solution of soda in water, and this seems to underlie the bed for a depth of 2 feet. The solution is so strong that when exposed to the air and sun soda rapidly crystallizes out and forms in layers to a depth of nearly 3 inches in less than thirty days. The valleys appear to have several permanent springs of water of small volume, but in the very center of the deposit there is a spring or water hole, where potable water can be had in quantity. No investigation has yet been made of this spring water, which may on analysis be found to contain enough soda in solution to give origin to the great deposit by long-continued evaporation. The existence of water fit to drink is a most important advantage in that arid region.

"The purity of the sodium carbonate of this deposit is remarkable. It is brought in from there in large masses almost free from sediment or earthy impurities. It may be obtained in clean crystals and crusts by solar evaporation of the concentrated or saturated water from the bottom of the bed, but in digging in a large way there appears to be a notable mixture of insoluble clay and very fine sand, an earthy impurity which probably has been blown in upon the soda lake by the winds from the surrounding hills of Colorado River silt, as shown by the analysis of the average sample:

Composition of the average sample.

	Per cent.
Sand, silt, etc., insoluble in water	13.00
Iron oxide and alumina	2.80
Lime	1.14
Salt	4.70
Sulphate of soda	4.70
Carbonate of soda	75.86
Total	100.00

"One avoirdupois pound of this sample leached with cold water gave 75 per cent of clean white sodium carbonate, including the small quantity of other soluble salts. Hot water gives a larger product. There appears to be an increase of weight by absorption of water. The weight and bulk of the product by lixiviation is much reduced by ignition, thus driving off a considerable amount of water. It would appear to be desirable to dissolve the trona and to filter and decant to get rid of the insoluble impurities, but this would perhaps remove the product from the free list and subject it to a considerable import duty in the ports of the United States.

"Another sample of selected crystals was analyzed by Prof. H. Forbes and Mr. M. H. Walker, jr., in the chemical laboratory of the agricultural experiment station of the university. They found the specific gravity to be 2.33. The qualitative examination showed, in addition to the carbonate of soda, a trace of chlorine and sulphates, no sulphides and no lime, barium, or silica, no potassium or ammonia. Some of the sodium was in the form of bicarbonate. The equivalent of 71.96 per cent of Na_2CO_3 was found by titration with standard HSO.

"The owners estimate that this deposit will yield 1,000 pounds of soda to each square yard of area, and that the soda can be taken out and put on shipboard for about $2 per ton. In one test it was found that one man could throw up 4 tons of the soda in one day.

"The height of the deposit above mean tide is about 27 feet. The plan is to construct a tramway to the water of an inlet navigable for lighters drawing less than 6 feet of water, by which the mineral can be transferred in bulk to a vessel lying in deep water.

"It is proposed to ship this trona to San Francisco, where an important use for it will be found in making borax from the crude tincal or boracic acid, of Nevada. It has been suggested, also, that the borate of lime (colemanite) of Nevada might be brought to Yuma, and there meet the carbonate of soda and produce borax.

"There is a scarcity of fuel at this locality, but for purposes of evaporation the ardent rays of the sun and the dry air are satisfactory."

GYPSUM.

Arizona has enormous deposits of gypsum both in the northern and in the southern counties. The transparent variety in clear sheets is known to the old Spanish residents as "yeso," and has been used in place of glass to admit light, while excluding air in the walls of adobe houses. In the fibrous form, with a satin-like luster, this mineral occurs sparingly, and is known as satin spar. But the common and most abundant form or occurrence is the massive and amorphous variety, the massive uncrystallized gypsum, useful as a fertilizing material and for the production of the quick-setting cement known as a plaster of paris. The native massive gypsum as quarried out from its beds contains 20 per cent of water of combination, which can be driven off by heat, leaving a white powder which has the property of rapidly taking up and combining with water again so as to set and harden.

At present the uses of gypsum in Arizona are few. It will hardly pay to transport and grind it for a fertilizer, though there is little doubt that it might be used to advantage upon some of the lands. Mr. Monier, the enterprising builder, of Tucson, has made use of the gypsum from the Sierritas Mountains to prepare plaster of paris in quantity at Tucson. This plaster of paris was used by him in finishing the walls of the interior of the new cathedral.

The occurrence of extensive stratified deposits of gypsum in the Santa Rita Mountains, about 25 miles from Tucson, was reported in the report for 1896. The deposits have not yet been worked.

SULPHUR.

The demand for sulphur having notably increased during the war with Spain, there were many inquiries for sources of sulphur in Arizona. The projected establishment also of works for the manufacture of sulphuric acid in Los Angeles has directed attention to any deposits of free burning iron pyrites of large extent, and near enough to rail or water transportation to avoid any large outlay for its delivery at the works.

Among other sources the banks of sulphur reported to exist at the head of the Gulf of California, and more accessible from Yuma than from any other point, have received special attention. It is stated that these deposits form a series of low hills of various colors, blue, red, green, and black, making the hills conspicuous objects for miles. They rise from the desert near the south boundary of the eastern end of San Diego County, Cal., about 20 miles above the mouth of the Colorado River.

COAL IN ARIZONA.

Investigations which I have made show that the rocks of the true Carboniferous period have a wide extension and distribution over the Territory, even as far west as Tucson. They are largely developed in the Chiricahua Mountains, and are there accompanied by coal measures, with thick beds of black carbonaceous shale and impure graphitic coal, showing indisputably the former extension of the ancient carboniferous flora far westward of the limits usually assigned to it. Although efforts have been made to find in these carbonaceous graphitic beds some seams of workable coal, suitable for fuel, they have not been rewarded with success, and the question whether good coal can be had from these coal measures is still unanswered. There have been small quantities taken out as samples which burn very well and could be claimed as hard anthracite, but most of the coaly mass carries a large amount of ash and burns with difficulty,

like the graphitic anthracite of Rhode Island, which it resembles. One bed of this material, about 12 feet, between the roof and floor, is a brilliant looking anthracite mass of graphitic shale. It certainly marks the horizon of a basin of ancient carboniferous vegetation of large extent. Similar croppings are reported for miles north and south. The beds are not horizontal, but are strongly uplifted and plicated.

Local intrusions and disturbances may also account for the extreme degree of metamorphism and the conversion of the former coal shale into a graphite anthracite.

These carbonaceous beds are believed to be on the line of the southern extension of the San Carlos coal fields, so called. It is reported that southward, in Mexico, a fair coal is secured from the southern extension of the same mountain range and that it is used by smiths. Notwithstanding the fact the outcrops so far opened have not produced coal, I consider it highly probable that at some place upon this coal horizon a good seam or basin may be found. The discovery of good mineral coal is of such importance to the people of the Territory that special explorations of the coal formations should be undertaken.

If reports are true, there are outcrops of good coal north of the Gila, upon the southern part of the San Carlos Indian Reservation, but the quantity and quality are both doubtful.

The existence of true coal measures in the Chiricahuas prepares me to lend credence to these reports. I certainly advise an exploration of this region.

The foregoing from my report of 1896 serves to introduce a copy of a more formal paper on the subject which I contributed to the pages of the American Geologist in June, 1898.

ANTHRACITE COAL IN ARIZONA.

Beds of graphitic anthracite coal occur in the mountains of the southeastern portion of Arizona. They crop out in considerable magnitude in the Chiricahua range of mountains near the bold summit, known as Cochises Head, south of the old camp Bowie and about 30 miles from the Southern Pacific Railroad at Teviston. The chief exposures are near Bridger's camp, at the head of Wood Creek. The beds are there in close association with shales, sandstones, limestones, and massive conglomerates, in regular strata, resting upon or against a crystalline gneissic and granitic foundation. The stratified formations are believed to be Carboniferous in age, and the coal is presumably a member of the series, but its exact relations stratigraphically have yet to be satisfactorily shown. The sequence of strata appears to be conglomerate—limestone, sandstone (quartzite), black siliceous shale coal, shales, plutonic dike, gneiss. The stratified formation attains a thickness of 2,000 feet or more. The limestones are largely developed and are generally blue and but little changed. They contain encrinities and here and there brachiopod shells, apparently *productus*. Other portions of the rock have been altered to white subcrystalline beds. There is an abundance of flint nodules and layers of flint. The strata dip northward at various angles, but generally less than 45°.

The coal beds crop out in a ravine. They have not been much explored, and some of the tunnels in which it is claimed that three beds were cut have caved in so as not to be accessible, but the great heaps of slacked coal and black dust at the mouths of such tunnels show that the material was found in quantity. The only accessible opening showed a thickness of glossy black graphitic anthracite over 12 feet in thickness. It reminds one of the hard graphitic anthracite of Rhode Island, but, except in selected specimens, it appears to carry more ash than the Rhode Island samples and to be even less available for fuel. It is hard to ignite. The percentage of ash is large, as will be seen from the following tabulated results of analysis made by me in the laboratory of the Arizona School of Mines:

Analysis of Arizona anthracite.

No.	Specific gravity.	Ash.	Combustible and water.	Remarks.
1	1.49	13.20	86.80	Selected fragments.
2	1.73–1.80	30.45	69.55	
3	1.76	27.40	72.60	Slaty.
4	1.85	30	70	Do.
5		22.04	77.96	Black powder.

No. 1 had red ashes; No. 2, white ash; No. 3, white ash tinged with red; No. 5, red ash. All the beds afford glossy, black, lustrous and shining masses, but generally in curved layers, and having a graphitic luster, except Nos. 1 and 5. No. 5 is taken out of the mine in a fine black powder.

It can not be claimed that any of this material has much value as a fuel. It may be found useful in some metallurgical operations as a deoxidizing agent, or for lining (brasqueing) crucibles and furnaces.

The presence of such large beds of carbonaceous material is significant of a great area of Paleozoic vegetation and of shallow seas and coal-forming basis analogous to those of the Coal Measures. If, as I confidently expect, further investigations shall show that these graphitic anthracites are metamorphosed coal beds of Carboniferous age, our present ideas of the westward extension of the flora of that period will require great modification.

There are many evidences in southern Arizona of shallow seas in Paleozoic time and of great tidal currents and of extensive shore lines. Coarse conglomerates of well-rounded pebbles of Paleozoic age abound in the Santa Ritas, in the Santa Catalinas, in the Babioquarari, and other mountain ranges, and in the low hills of Arivaca, south of Tucson, and near the boundary of Mexico.

Quartzites—probably Cambrian—are a striking feature of some of the mountain ranges between Tucson and the Gulf coast of Sonora.

THE COAL FIELDS OF NORTHEASTERN ARIZONA.

In northeastern Arizona, in Coconino County, there is an extensive coal field, the value of which has been demonstrated by careful explorations and tests by competent engineers during the present year. As at present determined, the area of these fields is fully 400 square miles. The coal is reported to be of a superior quality for steaming purposes, the tests showing that it burns freely without a heavy draft, and that it does not leave an excessive amount of ash—yielding better results in that respect than most soft coals, and sulphur being almost entirely absent. To give the field transportation facilities it would be necessary to construct a railroad between them and the Santa Fe Pacific Railway, a distance of some 70 miles. There appears to be no reason why these coal fields should not become the chief source of fuel supply to Arizona, at cheaper prices than those now prevailing. It is reported by the engineers who conducted the investigation of the district, that large deposits of alum and coal are found in the same locality.

PETROLEUM.

There are no springs or outflows of petroleum yet known to exist in Arizona. In December, 1896, the discovery of a variety of petroleum was announced at St. Davids, in Cochise County. While boring for water at this place a dark substance, having about the consistency of molasses, was found at a depth of 290 feet. This substance, supposedly a variety of rock, oil, or petroleum, was yellowish in color, and it is reported was found to be combustible, but samples have not been received at the School of Mines and nothing more definite than the above can be stated at this time, and it seems that no further investigations have been made.

Some parties, including Mr. McKay, of Tucson, who were prospecting for coal in the dark-colored shales (Coal Measures) of the Santa Ritas, east of Rosemont, took out masses of slaty rock which had the odor of petroleum. Samples submitted to me gave evidence of a very small quantity present, for oil could be distilled from it in a tube.

BUILDING AND ORNAMENTAL STONES.

The Territory of Arizona is well supplied with building materials of all descriptions in their crude or unworked state. Building stones are not only abundant, but are widely and generally distributed. Each mountain range is capable of contributing good stone for construction in some form. Granite, gneiss, and slates abound. So, also, limestones, sandstones, and materials for making mortars and cements. Marbles of various shades of color, white statuary marble to the black and veined varieties may be quarried in many places. There are several localities of onyx and marble of beautiful colors and grain.

Gypsum is abundant, and in many localities there are fine clays for the manufacture of brick and tile. Adobe clays suitable for the manufacture of adobe must not be omitted in this enumeration, for in the dry climate of the region,

adobes still maintain, as in the past, an important place in the list of materials for cheap construction, especially of dwelling houses.

The sandstones of Flagstaff and the tufas of Tucson have been utilized. The Flagstaff and other quarries on the line of the Atlantic and Pacific Railroad have supplied red sandstone and freestone of excellent quality and grain for important buildings in Phœnix and elsewhere. The white tufas of Tucson have been used in the construction of the university dormitory and for a private residence with great success. This material is excellent for building purposes. It is easily quarried and cut to dimension blocks. It has no perceptible rift, being homogeneous, and thus chips well in any direction. The fracture is conchoidal. It does not crumble. It is porus, a bad conductor of heat, and is durable and does not discolor.

FREESTONE, FLAGSTAFF.

The following is the result of an analysis by T. E. Chatard of a sample of the brown building stone from the Arizona Sandstone Company's quarries at Flagstaff. (Bull. U. S. Geol. Sur. No. 78, p. 124.)

Insoluble in HCl	79.15
Soluble in SiO_2	.04
Al_2O_3	1.30
Fe_2O_3	2.45
CaO	7.76
MgO	.23
CO_2	5.77
H_2O at 110°	.32
H_2O at red heat	2.94
Total	99.96

THE TUFAS OR TUFFS.

Among the more generally utilized building stones at the present time, especially at Tucson, the soft, easily cut volcanic sediment known as "tufas" have a prominent place. These rocks are fragmental in character and consist for the most part of volcanic ejecta, the result of explosive action upon previously formed crystalline rocks. The rocks appear to have been thoroughly comminuted, crushed, and powdered, and to have then been spread out in valleys or basins in the condition of soft mud, which afterwards became compact and consolidated. They generally show the presence of more or less pumice stone in powder and in small fragments. The tuffs are generally named from the rocks from the disintegration of which they have been derived. Thus the trachyte-lavas give trachyte tuffs, the basaltic lavas basalt tuffs or basalt breccias. The shyolitic lavas furnish shoylite tuffs, and the glassy lavas or obsideans give the pumiceous tuffs and breccias. (Building and Ornamental Stones, p. 283, cited by Merrill.)

The tuffs are largely used in the volcanic districts of Europe for building purposes. In the Haute Loire, France, they have been used in the construction of churches and dwelling houses. The "pepesino" of the Campagna of Rome and Naples is a tufa. According to Hull the tuffs were used in the construction of the buildings of Herculaneum and Pompeii. They are largely used in Japan for building walls, particularly for retaining walls, foundations, and for the walls of the "yaskis" or cattle of the Dainaios. These tuffs appear to have been derived chiefly from trachytic rocks, and are therefore classed as trachytic tuffs.

Tufa has been used for building in England. The so-called Sarsen stone, of Rochester, England, is a tufa brought, probably, from France and used by the Romans and Normans. (Rochester Naturalist, vol. 11, p. 33, cited in Blake's Annals Brit. Geol., 1891, p. 324).

The tufas are largely represented in the collection of building stones in the United States National Museum at Washington. According to Professor Merrill there are specimens of various kinds from the Western States and Territories; from California, New Mexico, Idaho, and Utah, and one from near Phœnix, Ariz. These collections have since been increased. Samples from the white tufa of Tucson have been sent there by the University of Arizona. The capitol of Arizona is being constructed of granite and tufa. The tufa is obtained from Kirkland Valley, Yavapai County.

Tuffs are thus shown to be common in the volcanic regions of the West, and also of Mexico, where they are largely used in building. At Denver, Colo., the Union Depot building, the Windsor Hotel, and other buildings are constructed of the light-gray and pink syholitic tuff of Douglas County, Colo.

PINK TUFA, TUCSON.

A tufa of similar origin to that of the white tufa of which the university dormitory is built also occurs in the Tucson Mountains on the west side, about 8 miles from Tucson, not far from the limekilns. The local name for the hills is Cerro El Gato. This is a recent discovery, and but a few loads of the stone had been brought into the city of Tucson in February, 1899.

The color is the salient feature. It is a very pleasing rose pink, which commands instant attention and admiration from all who see the stone. This color is uniform throughout the mass, and is due to finely disseminated oxide of iron, the vesqui oxide, or hematite. It is remarkable that it is so evenly spread, not showing in streaks or clouds or patches, but everywhere giving the uniform rose-colored shade.

The stone is homogenous, fine grained, and not granular or sandy, but is not suitable for polishing, being porous, yet firm in its texture. There are but few or no distinct inclusions, such as are found in the white tufa. The original magma would appear to have been found under less violent disruptive conditions, but yet in very nearly the same manner. It breaks with a broad conchoidal fracture and equally well in any direction. It is firm and strong, and can be easily cut and chiseled. It is not calcareous, but siliceous, consisting largely of silica, which is the cementing material.

The specific gravity is 2.55. A cubic foot would thus weigh 159.17 pounds, and about 13 cubic feet would weigh 1 ton. A test of its capacity for the absorption of water shows that when thoroughly dried and afterwards immersed it will take up a little over 5 per cent of its weight; 5.14 was obtained.

TUFA AT KINGMAN.

A good quality of tufa for building purposes occurs at Kingman or near that place. A sample sent to the Arizona School of Mines, by Mr. Charles Metcalf, shows that it can be readily cut with a saw or other tools in any direction, and that it will dress with sufficiently firm sharp edges and angles. It does not crumble easily when dry. It is firm and solid enough for ordinary building purposes. Specific gravity, 1.72; a cubic foot would thus weigh 107.36 pounds. A test of its capacity for absorption of water showed that the air-dried rock will take up 23¼ per cent of its own weight. This is a large percentage of absorption. It is darker in color than the tufa at Tucson. It may be called fawn colored or mouse colored, flecked with small fragments of white or cream-colored pumice stone. The rock is largely composed of pumice. It is in visible grains and patches. There are also grains of transparent feldspar (sanidine.) There is an obscure layering or stratification of all these materials. So far as can be judged from the sample there are no inclusions of large solid bodies. It is a fair material for walls in positions where it will not be exposed to water, and where, if wet, it will not be subjected to freezing temperature.

PHŒNIX TUFA.

The tufa from Phœnix appears to have been a friable variety. It is described by Merrill as follows: "It is of a white and gray color, sufficiently compacted to be cut in blocks of considerable size, and is stated to have (The Collection of Building and Ornamental Stones in the United States National Museum, by T. P. Merrill, Washington, 1889, p. 463) been used to some extent for building purposes." It is stated to occur in "blankets" from 3 to to 15 feet thick, more or less tilted, and cropping out near the base of the Mazatzal Mountains, at the edge of the Verde River Valley. The microscope shows this to be composed of pumice fragments of about 0.25 mm. greatest diameter, and apparently identical with that described by myself from southwestern Nebraska, and quite similar to that from east of the Black Hills, Dakota, described by Dr. Wadsworth in Science of July 24, 1885. (American Journal of Science, vol. 32, p. 203, 1886.)

In a series of experiments upon the building stones of Great Britain to determine their crushing strength and other properties (Mem. Proc. Int. Civil Engrs., Vol. CVII, 341–369, cited by J. F. Blake, Annals Brit. Geology for 1892, p. 242, by T. H. Beare) their cubes measure 2½ inches on a side where used. The average crushing strength, stated in tons, per square foot was found to be: For granites, 112.2; oolites, 141.3; sandstones, 489.8; dolomites, 500.5. The density was obtained by calculation from the weight divided by the calculated volume, and the weight per cubic foot by multiplying by 62.42 pounds. For the additional weight due to quarry water, the weight of absorbed water was added. To determine the absorption the dried stone was weighed and then left in water for six or seven days and then reweighed. The average absorption was found to be: For oolites, 8.96; dolomites, 5.43; sandstones, 4.68; and granites, 0.27 per cent.

FELDSPAR ROCK—AMORPHOUS FELSITES.

Upon some of the tributaries of the Hassayampa River above Walnut Grove there are stratified formations of a milk-white rock, which is apparently made up of the finer débris or the elutriated crushed fragments of whole feldspar. This formation is largely developed upon Milk Creek; hence, no doubt, the name. It varies in consistence or hardness, some of the beds being quite soft, and others, though finer in grain, are compact and break with a subconchoidal fracture. As a rule it is amorphous, earthy, and without definite layering or marks of stratification except by the bedding of large mattes. It is fusible to a blebby glass and gives off a little water. It can easily be cut with a knife, or sawed into blocks, or hewed into shape for building purposes with an ax. It has been used frequently for lining fireplaces and wears well, resisting the fire to such a degree as to lead many to suppose that it would make good fire brick, but this is a mistake.

MARBLE.

The resources of the Territory in white, black, and mottled marbles are great, but for the present the cost for hauling and transporting by rail to markets precludes the development of the beds except on a moderate scale for local consumption.

The industry of making cemetery monuments has already been established in Tucson. The marble is brought from quarries in the Santa Rita Mountains, some 20 miles east of the city. It is chiefly white, with blue veins, and it takes a good polish.

Fine-grained black marble of excellent quality has been brought in by Mr. W. B. McClary, of Tucson, to the museum of the School of Mines. The beds are not yet opened, but will no doubt supply good blocks of this desirable marble. Some remarkably fine white statuary marble, in large masses, was noted by me on the northeastern side of the Santa Catalinas, on Marble Peak. It has not been explored. The grain and texture are excellent.

Fine variegated and brecciated marbles are found cropping out on the slope of the hill at the Total Wreck mine, in the eastern spur of the Santa Ritas. This is easily accessible, and would add greatly to the beauty and variety of any decorative marble work.

No especial search has yet been made for ornamental varieties, and the demand for decorative slabs, panels, and mantels has not yet grown sufficiently in the land of adobe houses to justify great attention to the development of quarries.

ARIZONA ONYX MARBLE.

The increasing production and exportation of the unusually beautiful onyx marble found upon Big Bug Creek, in Yavapai County, deserves special notice. The deposit covers some 200 acres, and has become the property of the Arizona Onyx Company. It is about 26 miles from Prescott, in the vicinity of Mayers Station, on the stage road from Prescott to Phœnix.

Prof. George P. Merrill, of the United States National Museum, says of this stone that "it is traversed parallel with the planes of the deposition by wavy bands of color in all shades of amber, white, ocher-yellow, deep ocherous red, and green of a most beautiful emerald shade." He likens this onyx to that of Mexico, which it resembles, but he considers the Arizona stone to be vastly superior to that now sent into our markets from the Mexican quarries. A deposit on Cave Creek has been opened and worked by Phœnix capital, under an organization known as the Phœnix Onyx Company.

The following description has been furnished:

"The only quarry is located at Cave Creek, 45 miles northeast of Phœnix. Mr. B. Heyman, the owner of the mine, started a plant here last year for the purpose of cutting and polishing the onyx, but through dissatisfaction and incompetency of people employed he concluded to close down until practical, competent onyx men could be found. The mine covers 20 acres on a sidehill, and it is found in decomposed limestone, in bowlders varying in size from 2 or 3 to 25 and 30 cubic feet. Large pieces can be found, but not of so fine quality. The onyx is brought to Phœnix in the rough and cut in any form desired by gang saws, the same as used in cutting marble. Then it is placed upon a rubbing bed from 7 to 10 feet in diameter; then taken and honed down, afterwards being put under a polishing machine. Mr. Heyman has shown samples of the onyx taken from his mine to New York dealers who are experts, and all have pronounced it the finest grade of onyx yet produced in this country. The variety of colors are numerous and

very beautiful. The onyx used in the counter of the Auditorium annex in Chicago was taken from this mine. There is a very handsome fountain in Mr. Hudson's drug store of this city, also a counter at the Wave confectionery, covered with this onyx. Mr. Heyman has received orders for several carloads, squared off, for shipping, but on account of the loss in squaring he decided not to ship in this manner."

BLACK AND WHITE ONYX.

A beautiful variety of calcareous onyx has recently (1899) been discovered in the Territory and promises to become important. It consists of black and white zigzag bands, producing a most striking and pleasing effect, quite different from any of the colored varieties heretofore brought to notice. Samples were sent to the Territorial geologist by J. W. Burson, of Kirkland Valley. In some of them a red coloration adds to the beauty of the black and white layers. The shipment of a carload of this onyx to the Peoria Polishing Works was reported in July, 1899.

GREATERVILLE ONYX.

Another locality of a good quality of onyx marble has been found on the limestone ridge near Greaterville. It has been opened and worked to a limited extent by Mr. John B. Anderson, of that place.

LITHOGRAPHIC STONE.

A compact amorphous lime rock has been prospected with a view to its utilization for lithography. Its value for such purposes depends not only upon the texture and adaptation to absorption of water and faulty ink, but upon the size and homogeneity of the blocks. The results of the trials of the material obtained at Big Bug have not been reported

LIMESTONE CEMENTS.

As with building stones, so with limestones suitable for making lime for mortar; they are abundant and accessible at nearly all points where they are needed. At Tucson good lime is burned in the Tucson Mountains a few miles west of the city.

At Tempe there is a limestone which makes an excellent hydraulic lime mortar. It is believed that abundant deposits of material suitable for the manufacture of hydraulic cement can be found among the many varieties of volcanic ejecta distributed through the mountains. There are remarkable examples of natural cemented breccias and conglomerates in the Bradshaw Mountains and elsewhere.

The caliche, which crops out along the mesas and gravelly deposits, makes a strong mortar when burned and mixed with sand.

Samples of the cemented material dug from the mesa near to the ancient ruins beyond Florence were sent to the Territorial geologist for analysis by Rev. J. F. Whittemore, the custodian of the Casa Grande. It was supposed that the ancient builders might have secured similar materials for making a cement for the foundation. The investigation showed that the mixture is much like the caliche of the Tucson mesa, and that by careful burning at a low heat a very good mortar can be made, after slacking, by raking out the coarser pebbles and stones. It seemed most probable to the writer that the buildings were reared upon the naturally formed cement or caliche, and that an artificial cement was not maue for a foundation.

SILICIFIED WOOD.

The finest and largest specimens of silicified wood in the known world are obtained at Chalcedony Park, near Holbrook, Apache County, Ariz. Whole trunks of trees and stumps with portions of the roots are found there converted into stone as dense and hard as the finest agate. Every cell and fiber of the former wood is preserved in stone. The specimens are often called "agatized wood" and also "petrified wood." A forest of trees appears to have been entombed in the rocks and to have been preserved by a slow process of replacement by silicia from solutions permeating the beds. Subsequently the surrounding sediments have been washed away, while the enduring fossilized trees remained. Tons upon tons of specimens have been taken away from the locality by collectors and dealers. A large quantity was shipped to Sioux Falls, S. Dak., to the large establishment founded there by the Drake Company, James H. Drake, president, for cutting and polishing the granites and porphyries of the Northwest

for architectural and decorative work. Sections or these trees 4 feet in diameter and large enough for tops of tables were cut and polished. Many specimens were shown at the New Orleans Exposition and at the Paris Exposition in 1889, and at the World's Fair, Chicago, where they were greatly admired for the perfect preservation of every detail of structure of the wood, for the very high polish, and for the exquisite interblending of colors in the mass due to the presence of various oxides in the original silicifying solutions.

The silicified woods of this locality in Arizona were first made known to the world through the collection of M. Jules Marcou, the geologist of the thirty-fifth parallel (Whipple's) survey for a railroad route to the Pacific Ocean. (Vide Vol. III of the United States Pacific Railroad Surveys). The writer had the first specimen cut and polished fron this collection in 1855. For a notice of the objects shown in Paris in 1889, reference may be made to the reports of the United States commissioners (1889), volume 1, page 414. For this exhibit of Arizona fossil wood, or "agatized wood," the exhibitor, the Drake Company, received a gold medal.

Very interesting specimens of silicified wood occur in quantity upon some of the mesas bordering the Colorado River, especially upon the mesas of the desert west of the Colorado, near the Vallecito and San Felipe, in California.

A very fine specimen of such silicified wood was procured by Herbert Brown, esq., superintendent of the Territorial prison at Yuma, and was presented by him in May, 1899, to the museum at the University of Tucson. It is about 8 inches in diameter and over a yard long; a straight stick or log with several notches and distinct grain, but now one solid mass of stone, the silica having replaced and filled every cell and pore of the wood so as to preserve even microscopic details in an imperishable adamantine form.

CHALCHUITL TURQUOISE.

Several localities of this ornamental stone or gem are known in Arizona. The two most important are one in Mohave County and the other in the Dragoon Mountains. At both these places there are ancient, prehistoric excavations, made by the original races in search of the gem known to them as the "chalchuitl." They prized this gem most highly, and it appears to have been known and valued all over the region formerly so thickly occupied by the prehistoric peoples in New Mexico and Arizona and southward in Mexico, even to and perhaps beyond the ancient Aztec capital. Montezuma held the chalchuitl in high esteem. He showed great favor to the royal home of Spain by sending four chalchuite stones as a present through Cortez.

The presence of fragments of this gem, or small ornaments made of it, in ancient ruins and places of sepulture in places widely separated, together with the far distant points at which veins of it were worked, show the universality of the appreciation of this gem. So also the high appreciation in which the gem is held at the present time by the Navajoes, the Zunis, and other tribes of Pueblo Indians shows, or at least indicates, that the Pueblo tribes of to-day are the living representatives of the people who dwelt in cities along the Salt River and Gila valleys.

Mr. A. B. Fenzel, civil engineer, of New York, has recently (1899) opened up the ancient workings in Mohave County and contributed an interesting article on his discoveries to the Engineering and Mining Journal of New York. He opened an ancient shaft which was filled up with débris and overgrown by shrubs and mesquite trees, and unearthed a large amount of loose pieces of turquoise, and masses of rock penetrated by veinlets of the mineral, and in addition a great number of stone tools, such as hammers, mauls, and chisels, which evidently had had hard usage in the work of getting out the gem.

POTTERS AND BRICK CLAYS.

The Territory is rich in the possession of numerous and excellent deposits of clays suitable for many purposes. These clays are of all grades, from the coarsest and most common brick clays to the finest description of potter's clay especially well suited to the manufacture of tiles. Most of the deposits are undeveloped. They remain in their original state and await the touch of enterprise and capital. The brick industry has, however, been established locally at many places, notably at Tucson, where many of the kilns are burned annually. The material is dug in the valley of the Santa Cruz, not over a mile from the central part of the city. A fair article of red brick is produced and is now largely used in the construction of buildings, not only stores and warehouses, but dwellings and cottages of small size. Brick is rapidly displacing adobes for such constructions, as they cost but little more, and are much more durable and satisfactory.

FIRE CLAY.

The coal seams at Bridgers, in the Chincahuas, furnish some excellent fire clays. Some of it is quite white and other samples are nearly black from the carbon mixed in. Two samples examined by me at the School of Mines show that the white is very clean and pure and is an excellent fire clay. So, also, a sample of a hard black mass, breaking like a stone, is easily cut with a knife and exhibits a fine, dense grain. It becomes white in heating and appears to be an excellent fire clay charged with carbon.

Deposits near Benson have been more worked than those at Bridgers and have supplied the furnaces at Bisbee with material pronounced by Mr. Lew. Williams equal in quality to any fire clay he has ever used. This clay is like that at Bridgers, highly charged with carbonaceous matter, and has a black coal-like appearance.

GRAPHITIC FIRE CLAY.

A large deposit of graphitic fire clay is found in the northern end of the Whetstone Range, in Cochise County, about 7 miles from Benson. The cropping which is best known is situated about a mile and a half from the base of the mountains, near to the old Kinnear place. The clay was discovered and located by an old-time resident by the name of Dan Duty. During the time of the running of the smelter at Benson he found a market for considerable quantities of the material, which was very useful about the furnace. Since Mr. Duty's death, several years ago, and the closing down of the smelter, the deposit has not been regularly worked, and the ownership has passed through several hands. At the present time claims are owned by L. D. Redfield and A. A. Castenada. Shipments by rail from Benson to the copper-smelting furnaces of the Copper Queen at Bisbee are occasionally made, where the material is mixed with silica for the lining of the pneumatic converters and for other purposes.

The sample forwarded by request to the Arizona School of Mines is said by F. S. Webster, the Southern Pacific Railroad agent at Benson, to be about an average of the product, but it is claimed that there are streaks or portions of the bed that are much softer and finer in grain and quality. The general aspect of the mass is that of an impure, slaty anthracite coal. It is black and graphitic, is easily reduced to powder, and, with water, makes a black, plastic mass.

It evidently contains diffused carbon. When heated, with access of air, this carbon is gradually burned out on the surface and the mass loses color, becoming ash gray. When pulverized and ignited for some time, the carbon disappears, a loss of weight of 8¼ per cent indicating its amount, together with a very small quantity of hygrosdopic moisture. That the earthy body of the substance is not either pure clay or pure silica is shown by its fusibility at a high heat to a slag-like, glassy substance. It thus "frits" at a temperature below fusion and forms a coherent mass, which gives it a desirable building quality, and the diffused carbon is a desirable ingredient.

There appears to be practically an unlimited amount of this material. The bed is described as having a thickness in places of 30 feet or more, measured at right angles to the dip, which is about 65 degrees. The trend or direction of the outcrop is east and west. It occurs in "red slate" between croppings of granite. It would appear to represent an ancient horizon of vegetation, probably of the Carboniferous period, and similar to the graphitic coal beds of the Chiricahuas further east beyond the Dragoon Range and the broad Sulphur Springs Valley, giving us another link in the chain of evidence of the former existence of a rich Carboniferous flora in this part of Arizona.

This clay can be had f. o. b. Benson at from $8 to $10 per ton. The rate of freight per ton from Bisbee to Tucson is $4.20, but it would appear, probably, that this could be modified for a rough, crude material of manufacture conducive to the success of smelting operations.

SCOURING STONE.

A superior article of stone suited to general scouring purposes on wood or metals has been discovered and opened up at Flagstaff by A. F. McDermid and his associates. This stone is snow-white and homogenous, and can be hewed with an ax or cut out with a saw into brick-like blocks of any required size. It has a soft, open grain of sharp, but fine, grit, which adapts it in an eminent degree to scouring work. It is like the holystones of best quality used for scouring the decks of ships, and it can be similarly used, but is a finer grain. It is adapted to scouring and nibbling down woodwork as a substitute for pumice stone or sandpaper, and it can also be used for scouring brass, copper, iron, and steel, and could replace bath brick for cleaning table knives.

NOTES ON THE GEOLOGY OF ARIZONA.

It is not possible at the present time to give a general connected view of the geology of the Territory of Arizona. The field is a broad one and is comparatively unknown and unexplored. Years of faithful labor and the correlation of the results of many observers are essential to the preparation of any generalized view of the varied and intricate structure of the mountains, valleys, and plateaus of the Territory. From one point of view much has already been accomplished. There have been many very important contributions to our knowledge of geologic structure of the Territory. The greater portion of the contributions made by official governmental surveys relates to the region in the northern portion of the Territory contiguous to the Grand Canyon of the Colorado.

We are indebted to Dutton for his superb monograph upon the Tertiary History of the Grand Canyon, and to Powell for the results of his explorations. Marcou, who accompanied Whipple and Ives on the survey of the line 35° parallel, gave us the results of a mining reconnoissance across the Territory to the Mohave in California. Newberry with Ives on the Colorado River expedition gave us additional knowledge.

Publications relating to the geology of the central and southern part of the Territory are few in number. Blandy has written a paper with a map of the mining region about Prescott (Trans. Amer. Inst. Min. Engr., XI, 286, 1883), but the field of middle and southern Arizona is comparatively new and unknown. He has also published a notice of the occurrence of Secondary or Triassic sandstone in southwestern Arizona. (Engr. Min. Jour., November 4, 1893.)

Pumpelly, in a contribution to the Academy of Science of California, gave some glimpses of the geology of the Santa Cruz valley and the mountains bordering it near the Patagonia, the Heintzelman, and the Santa Rita mines.

The importance of all accurate information concerning the mining region of the central mass of mountains, known as the Bradshaws, justifies the reproduction here of the paper written by Mr. John F. Blandy, the former Territorial geologist, and published originally in 1883 in the Transactions of the American Institute of Mining Engineers, with a map, which last, however, is here necessarily omitted.

THE MINING REGION AROUND PRESCOTT, ARIZ.

With the report of mining statistics for the year 1872 there was published a geological map of the United States and Territories. This is, I believe, the only map which represents the geology of Arizona, and is, as far as my observations go, correct. It is, however, on so small a scale as to be of little practical value to the miner. I know of no other maps, even of localities of this Territory. The topographical maps are also on so small a scale as not even to serve as guides from place to place; the largest, that of Eckhoff and Ricker, being only 30 by 30 inches to represent a territory of 135,000 square miles. For these reasons it makes it exceedingly difficult to describe the various mining centers in an intelligent manner, and equally so to examine such a hilly country as it is intended to describe in this paper.

When I first came into this Territory I soon realized the trouble I had to encounter in trying to form an opinion, or even to get the needed information on the geological contour. I have, therefore, labored as best I could to get a topographical diagram of the section of country represented by the map which accompanies this paper. (By C. H. Hitchcock and Wm. P. Blake—the same map with few corrections which was contributed to the reports of the United States census under Gen. F. A. Walker.)

The lines run by the land department up the valleys of the Aqua Fria and those west of the Hassayampa, and connected east and west to the north of Prescott, enabled me to correctly inclose the space covered by the Bradshaw and Sierra Prieta mountain groups, but the territory covered by these mountains, and the most difficult part, I have had to fill up as best I could. I have met with such success as to meet the approbation of those most familiar with the country, and with the map in hand anyone would be able to cross it in any direction. As there has not been a single line of survey across it this has been no small undertaking, and I have had to depend upon sights from prominent points with the pocket compass, or, in absence of that, to make observations with watch in hand and guess as near as possible the meridian direction. But one main wagon road passes through the district, that from Prescott to the Peck mine.

Having constructed a map with approximate correctness, it remains to mark in the general geology, but it is still difficult to draw accurately the distinct lines of junction between the formations. To do this requires an amount of muscular

exertion that no one can understand unless he has tried it in such a hill country, a region of gulches and steep, rocky hillsides, most of it covered with a growth of tangled, thorny bushes or prickly, poisonous cactus plants. I have therefore only marked the general run of the rocks, without attempting the line of the boundaries of any. It is only meant as a skeleton upon which others may assist in filling in the detail as they may be able. It is the detailed geology of a region which is of the most assistance to the miner, and it cannot be too minute. I am not aware that a geological map has been issued of any locality of Arizona.

I shall refer only to that part of the map which shows the country between the Peck mine and the town of Prescott. The Peck mine is situated in a primary slate formation, the north boundary of which is at Bear Run. This sweeps around in a northerly direction, crossing Turkey Creek and the mouth of Wolf Creek, the head of Cedar Creek, and after crossing the Big Bug Creek to the north of the station passes northward by the Silver Belt mine, and is lost to view under the Aqua Fria flats and Lonesome Valley, or what is marked on the Government maps as the Prescott Plains. To the north of this formation we have a porphyritic-granite ridge, passing from the Tuscumbia mine through the Trinity, crossing Turkey Creek at the mouth of Pine Creek, thence over the high divide between Pine and Wolf creeks. This does not show itself at Big Bug Creek, unless the small field of granite near Boggs be a continuation of the same. Next north of this granite ridge we have a syenite gneiss, covering the country up to the foot of Mount Union, with the exception of a narrow belt of hornblende slate, which crosses Turkey Creek at the Masterson Mill. This brings us to the great granite center of Mount Union. From its sides start out the various streams of Main and East Hassayampa, Turkey, Big Bug, and Lynx creeks. Mount Union is said to be the highest peak, with the exception of San Francisco Mountain, in Yavapai County, which would make it about 10,000 feet above tide. It, with two neighboring peaks, one to the north, the other to the south, appears more like a north and south ridge of granite, and throws out a finger forming the dividing ridge between the Big Bug and Lynx creeks, reaching nearly to the Silver Belt mine, where it abuts against the high tilted slates of the first-mentioned formation. Another finger is thrown out to the southwestward, forming the divide between the East Hassayampa and Turkey Creek, the highest point of which lies between the Bodie and Bully Bueno mines. At the point where the Peck road crosses this divide, at the lowest point, it is hidden by a thin covering of the syenite gneiss. Between Big Bug Creek and the head of Wolf Creek lies a high plateau called the "Mesa." This is a sheet of malpais or lava from 50 to 100 feet or more in thickness, which rests upon the vertical strata of the syenite gneiss. The valley of Lynx Creek is occupied by a more or less stratified granitic rock, which extends southward across the head of Hassayampa, and beyond the Senator mine. This is separated from the large field of granite which surrounds Prescott by the ridge of hornblende schists which crosses the Hassayampa at the bridge and forms a divide between it and Lynx Creek, and in which heads the North Wolf, Groom, and Granite creeks, the highest point of which is Spruce Mountain. The Prescott granite extending northward to the great mass of Granite Mountain, here and there incloses patches of hornblende slates and syenite gneiss, and is intersected by trap dikes and protrusions of columnar basalt. Of the latter, two fine examples are to be seen near the town—Thumb Butte and a hill near the mouth of Banning Creek. To the north of Prescott on the east side of Granite Creek can be seen the syenitic gneiss which underlies the county eastward to lower Lynx Creek. We now have a general outline of the geology of the space lying between the Peck mine and Prescott. I have seen too little of that lying to the westward or of that lying to the east of the Aqua Fria to refer to it at present. It only remains to make some reference to the veins occurring in the various formations.

The large majority of these, whether in the stratified rocks or in the granite, have a northward and southward trend, varying, say, from north 20° east and south 20° west to north 20° west and south 20° east. The exceptions do not vary greatly from this, though I have noticed a few that have a nearly east and west course.

Among the stratified rocks a large number are what might be called "layer" veins; that is, they strike and dip with the formation and are limited in length, seldom extending for more than three or four mining claims. In many instances I have supposed these to be formed by the warping of the strata, causing openings to be made between the strata. This is particularly the case where the white quartz ledges occur, as in the belt in which are the Bully Bueno, Yaho, and the gold ledges on Pine Creek.

The veins in the slate formation of the Peck district occur in, or in contact with, heavy quartz strata, locally called quartz dikes, and carry silver in form of

chlorides, sulphides, and in galena. In some of the veins large amounts of carbonate of iron occur. The quartz dikes are the conspicuous features of the district, standing like high walls, sometimes as much as 50 feet above the slates. The finest examples of these walls can be seen near the mouth of the Wolf Creek, where they occur not more than 6 feet thick at the base and stand at least 50 feet high, terminating in pinnacles, a fair representation also of the dip of the strata.

The veins in the granite ridge next north seem to occur in groups, as at Tuscumbia, Trinity, and on the east slope of the Wolf Creek ridge. In these the ores are also silver bearing, in form of chlorides with lead, brittle silver ores, and in galena and blende. The principal vein matter is quartz and barytes.

In the syenitic gneiss region the veins are all silver bearing with the exception of the belt referred to above, which passes through from the Bully Bueno mine across Pine and Wolf creeks, which are gold-bearing quartz veins. Between this belt and the granite on the south the rest are much the same in nature as those of the granite, with the exception that there is but little antimony in combination. The vein stones are the same. To the north of the gold belt up to the foot of the Mount Union granite the amount of galena in the vein increases in quantity as you go northward until finally argentiferous galena with much pyrites is almost the only ore. The barytes also becomes less and less, and quartz increases in quantity. In this section I have found the only lime spar, in form of nail head, that I have seen in this region. This occurs in the Goodwin vein.

The veins in the Mount Union granite are all gold bearing, many of them also carrying silver in combination with galena, and large amounts of pyrites. The gold in the croppings of the veins, and to a limited depth, is free, but below altogether in the pyrites. Some veins are found containing large amounts of carbonates of lead which yields well in silver. The decomposition of these veins and of those in Lynx Creek Valley is the source which has supplied the gold to the placers in all the streams heading in this mountain, more particularly to the Hassayampa and Lynx creeks. In some of the veins of this formation is to be found much blende of a very dark character.

The veins of Lynx Creek Valley are, as a rule, the largest of the region, varying in width from 2 to 20 and 30 feet. They carry gold and silver in varying quantities. Sometimes pockets are met with yielding at the rate of several hundred dollars per ton in gold. The occurrence of silver is much more uniform. Most of these veins have been prospected largely in the cropping and the ore worked in arrastres. This has been, however, to a limited depth, I believe never over 30 feet, and most of them much less, as the baser ores occur, and the miners have had no means of treating them.

Below the decomposed croppings the ores are the basest of the region, being a mixture in every conceivable variation of sulphurets of iron, zinc, antimony, lead, and copper. Of course, all are not equally contaminated, as in some pyrites form the mass of the ore; in others but little copper is to be seen. As a rule, it may be said that the ores will average some $60 per ton in the precious metals. This district is generally regarded as the gold section of the region. The prevailing vein stone is quartz and decomposed wall rock. The only rare metals I have heard of as recurring in these veins are molybdates and phosphates of lead in the Occidental mine, but I have seen none.

The veins of the hornblende schist range are gold and silver bearing, apparently in about equal quantities. The silver occurs as chloride, and also in galena, many very rich and large specimens of the former (horn silver) having been found. In some of the veins very rich streaks of gold have been encountered by the prospectors. Much of the vein material is of a talcose, slaty nature near the walls, and the ore streak is largely made up in many of the veins of a very flinty, yellowish-brown, massive quartz. This is particularly the case where galena occurs in the vein. But few veins—and hardly any of note—have been opened in the Prescott granite. On the southern edge of it, along the Hassayampa, some strong veins of gold-bearing pyrites have been opened. A strong galena vein, with a small amount of pyrites and a large vein of copper pyrites, has been developed to some extent.

To this meager description of the region I might add that a band of porphyritic slate extends on the east side of the Aqua Fria, from the Homestake mine, at the western foot of the Black Hills, southward to Copper Mountain. Whether this formation lies next, east to the slates of the Peck district, or not I can not tell, not having closely examined it. So far as examined, these porphyritic slates show veins of copper ore of high grade, containing silver in greater or less quantities from $7 to $35 per ton. On the map I have marked approximately the sections covered with timber. This consists of pine, oak, and juniper.

The streams—called creeks for the want of a better name—might more properly be called sluiceways to carry off the heavy falls of water in the rainy season.

There is, however, a small amount of running water in all of them for most of the year, particularly in the winter and spring, caused by the melting of the snows.

As I have said, this is but a meager description of the geology of a large and important mineral district; but I have meant it only as a beginning by furnishing an outline of the district and giving an opportunity for others to assist in building upon the foundations which are thus begun.

It will be understood that the mineral district extends much beyond that part which I have attempted to describe. It reaches southeastward to the Tip Top mine region, the copper deposits of Castle Creek, the Tiger district, and southwestward to the Vulture mine near Wickenburg, and the gold mine of Antelope Peak; westward to include the copper mines in Copper Basin, and on the east it covers the copper and silver mines of the Black Hills and Ash Creek, and the gold region of Cherry Creek near the Verde. To these may be added the gold mines and placers of the Black Canyon and Squaw Creek. This region possesses as fine a climate as can be found in the United States—fine open weather in winter with but few storms, and those of snow. The nights, from November to April, are cold, although the days may be clear and balmy. In summer, though the thermometer may register 105° to 110° in the shade, the atmosphere is by no means as oppressive as in the Atlantic States at 85° to 90°. There are but very few days in the year when it is too disagreeable to work in the open air. Many severe things have been said of "dry Arizona," but it has never been called the "land of beautiful and glorious sunshine," to which it is entitled.

Arizonian Slates, Bradshaw Mountains.

The following notes upon the rocks of the Bradshaws are from my own observations:

The great central mountain mass of Arizona, generally known as the Bradshaws, includes many subdivisions, known as Granite Mountains, Weaver Mountains, Kendrick Mountains, and Wickenburg Mountains, as shown on the latest Government maps. The topography there given is largely according to the best fancy and skill of the topographical draftsman in the absence of any good field work. The area is wide and diversified, but it may be said that the rocks are chiefly crystalline and very ancient, representing the Archæan, Laurentian, and Huronian. There are large areas of compact homogeneous granite, much of which seems to be intrusive. There are ancient gneissic rocks of varying degrees of metamorphism, of compression and folding, such as those above the Walnut Grove Dam, and in the ridges above toward Minnehaha Flat. Granite abounds around Prescott. It crops in fine gray masses at the Tiger Mine. It is there fine grained, with small even-sized crystals of black biotine mica and some sphene. It weathers into large bowlders of disintegration. Just beyond the Tiger vein, which is near the contact, this granite is succeeded by slates, sandy and siliceous, with traces of pebbly beds forming a part of an extensive development of distinctly sedimentary rocks which form great hills, and extend over eastwardly to and beyond Humbug Creek, the tributary of the Agua Fria, and noted in the mining annals of Arizona for its rich gold placers, which, no doubt, were fed from the many gold-bearing veins which traverse these slates. This is a slate formation which is extensively developed in Arizona. Lithologically it is like the Berkshire, Massachusetts, Taconic slates, and I have called them the Arizonian slates.

Vulture to Wickenburg.

The vein at the Vulture is in ancient slates and gneissic rocks, probably more ancient than the slates at Cave Creek. From these outcrops we rise upon the undulating surface of low hills of volcanic origin or outflow, generally soft and amygdaloidal, of local extent, having been cut through by long erosion to the bed. In places the argillaceous slates pass into dark-colored hornblende slates, becoming compact, gneissic, and syenitic, and all much seamed and ribbed with dikes of feldspathic or granite rock, and with porphyritic dikes to the summit, about halfway, and thence upon granite to the Hassayampa. Passing up the Hassayampa above Grant's store and the old Vulture Mill, there is a bluff of comparatively modern lava, which flowed out over the terrace of river gravel and has protected it from washing away. From near this place, the long regular slope extends upward to the base of the mountains, about six miles. It is covered with grasses and cactacea, but very few or no trees nor shrubs of great size. The soil appears to be exceedingly rich and fertile whenever water is put upon it, and to be composed largely of volcanic mud, and ashes or the débris and silt from the decomposition of lavas and trufaceous deposits. This soil and slope appear to be

most admirably adapted to viticulture, and would no doubt produce grapes from which a most superior grade and variety of wine could be made. This slope and soil extend to the mountains at Antelope, and beyond Barney Martin's old place is near to the base of Rich Hill, sometimes called Weaver Mountain. The side next to Martin's is composed of a fine-grained white granite, with a large amount of quartz in it and black mica. It is gneissic, in regular layers, and appears like a highly altered old sandstone. The bedding pitches northerly at a low angle—about 30 to 35 degrees. It may be called a granulitic granite; it appears to form the lower part of the mountain, the upper portion having a darker and brown color.

West of Antelope (or Martin's) the slate formation crops out, and as at other places is marked by a white quartz vein, dipping northward and resembling the quartz lode known as the Leviathan, of which it is supposed to be a part, separated by some great fault, heave, or displacement. This quartz seemed quite barren and worthless for gold mining, though there may be rich pockets of coarse gold. Granite crops out west of the Leviathans lode hill. It is a granular gray granite of coarse texture, and has some isolated crystals of feldspar. The Marcus gold vein traverses this rock in an east and west direction and the granite is much altered and decomposed along its course.

RICH HILL TO WALNUT GROVE.

From Antelope or Stanton the road northward to the Hassayampa at Walnut Grove is upon granite, passing into gneissic rock. Much of the granite is compact, gray, and a homogeneous rock, weathering into great rounded masses, like that seen north of Phœnix, at Tombstone and other places. The rock is especially well developed and marked by disintegration bowlder-like formations at People's Valley, where extremely picturesque avenues are formed by the linear outcrops of Cyclopean blocks, between which there is an abundant growth of the evergreen oak. Similar conditions are found at and near Russellville, north of Dragoon station. After passing the summit and approaching the Hassayampa Valley the granite becomes more gneissic, with a large amount of epidote and dikes or veins of granite traversing it.

COTTONWOOD CREEK.

A deep gorge-like canyon is bordered by volcanic sediments, the beginning of the extensive formation of this nature which occupies a large part of the Walnut Grove Basin or area above the great Hassayampa Canyon. The left bank of this creek is a bluff of the upturned beds of basaltic lava, alternating with volcanic sediments. A portion of the creek runs in the midst of such sediments which are largely formed of pebbles and fragments of plutonic rocks firmly cemented together by a gray cement, making a rock as hard as any artificial concrete.

THE DAM SITE AT WALNUT GROVE.

The rocks at the head of the canyon of the Hassayampa, where the dam was located, are granitic and gneissic. They are very firm and compact, and are evidently metamorphic. The planes of structure or ancient sedimentation are well developed, giving the rock a tabular form, well suited to rough construction. The portion of rock pierced by the tunnel for the pipe outlet of the dam was excessively hard, being formed largely of vitreous quartz, probably the altered form of an ancient sandstone, but without the preservation of its former granular condition. The rocks a short distance north are much more marked in their ancient sedimentary character, though now highly crystalline.

AGUA FRIA AND CAVE CREEK.

The foothills of the mountains north and northwest of Phœnix are formed largely of an ancient, regularly stratified slate, resting at an angle of about 40 degrees upon granite and dipping to the northeast. On the road to Cave Creek both granite and slates are crossed, the granite generally forming lower hills than the slates. The bed rock at the Phœnix mine on Cave Creek is slate. At the Chautauqua and Yellow Jacket claims, about 3 miles west, there are large hills of slate overlying granite at about the same angle as farther east.

BOS ARIZONICA (FOSSIL BOVINE).

A box full of fragments of bone, sent to the museum of the School of Mines for identification by Mr. P. J. Coyne and Thomas Deering, on being put together

proved to be the horn cores of a gigantic prehistoric bovine quadruped for which the name Bos Arizonica is proposed. The find was dug by the gold placer miners from the gravel deposits of Greaterville, on the eastern side of the Santa Rit Mountains, in Pima County, some 40 miles from Tucson. Unfortunately the bones of the skull were too much broken up to permit of restoration, so it is not possible to gain any satisfactory knowledge of its dimensions and generic characters. The horn cores, however, show that the animal must have had a huge head and neck, so as to support and make use of horns of such great weight as the dimensions indicate. These dimensions are: Circumference of the largest end, near the base, where the horn joined the skull, 17½ inches; of the smaller end, 12 inches from the base, 13 inches; length of the portion restored, 17 inches; probable extreme length if complete, 23 to 24 inches. It is not much curved. The form is nearly cylindrical in section and is conoidal, but at least twice as large as the largest-sized horn cores of our domestic bulls. The form of the horn, it would appear, must have closely resembled the form familiar to us with the bulls of the Hereford breed rather than those of the Durham shorthorn, or the more elongated and crooked horns of the Holsteins. The form differs decidedly from any buffalo horn ever known. It does not resemble the horn of the East Indian buffalo.

Somewhat similar fossil horn cores have been found in Texas, in Ohio, at Big Bone Lick, Kentucky, and in Nebraska. And there is a resemblance in size at least to the great horn cores found in Europe which belonged to the recently extinct Bos Urus or primi-genius. The affiliations of this species, once so abundant, with the American species have not been yet sufficiently studied, but Dr. Leidy thought that the American species were different from the European. He has described one of the fossils with horn cores 20 inches in circumference as Bison latifrous. Prof. O. C. Marsh has described two other species, based upon fossil horn cores from Nebraska, as Bison ferox and Bison Alleni. By the courtesy of Professor Marsh I was permitted to critically examine those fossils in the Peabody Museum at Yale University, and to compare them with the fossil from Greaterville, Ariz. This last is thicker than the Nebraska specimens in proportion to its length, and is less curved. A full notice of *B. arizonica* has been sent to the American Geologist for publication.

MASTODON REMAINS IN ARIZONA.

Two molar teeth of the mastodon were dug from the deep vegetable mold of borders of the great spring at Andrade ranch, on the western slope of the Santa Rita Mountains, in Pima County, Ariz., about 20 miles east of Tucson. These teeth, weighing 4 pounds each, are in an excellent state of preservation and do not appear to have very great antiquity, though ages must have passed since the animal which bore them was mired in the soft mud of this spring. The length of these teeth is 6½ inches. The roots are about the same length. The anterior fangs are separate from the others, and are much curved backward, and in one specimen are twisted one across the other. An enamel-like coating of a dark-brown color covers the whole of the roots, and when this coating is dry it easily breaks or scales off and shows a very clean white dentine below. The roots are also distinctly annulated, the annulations being about one-fourth of an inch wide.

The animal was advanced in years, for the crowns of the molars are worn down so much that the cone-like cusps, so characteristic of the dentition of the mastodon, are gone, and instead of them the dentine or ivory has a cup-shaped surface surrounded by ridges of the thick and hard enamel.

The mastodon from whose jaws these teeth came must have been over 10 feet high and perhaps 20 feet long. The discovery of these remains is important and interesting, showing that these great herbiferous animals once roamed over our valleys. They were great feeders, and there must have been a much more abundant growth of vegetation when they lived than now exists, and therefore a much larger water supply—another link in the chain of evidence of the gradual dessication of the earth's surface and the much smaller rainfall and stream volume than formerly.

Two more finds of similar teeth have been reported, one near Bowie and the other west of Tucson toward the Quijotoas, but have not been sufficiently verified.

DEVONIAN AND SILURIAN FORMATIONS.

The great mass of the Santa Catalina Mountains is made up of granite and gneissic rocks of Archæn age: but on the northeastern slope, near to the American Flag mine, in the Old Hat district, there are extended outcrops of ancient Paleozoic strata dipping toward the east. In addition to basal conglomerates, made

up of thoroughly rounded bowlders and pebble, there is a thick series of red sandstones, shales, and quartzites, succeeded above by earthy and shaly limestones, in the midst of which there is a stratum of well-preserved corals, among which a branching form is much like a coral found on the Verde River and referred by Professor Meek to the Devonian. (See Paleontology of Fortieth Parallel Survey, IV, 27, and pl. 11, fig. 8.)

It is interesting to note that a large quartz vein traversing the basal red sandstones and shales is auriferous.

Farther south, in the Santa Rita range, in the region of Rosemont and of Greaterville, on the east side of the mountains, limestones and quartzites are extensively developed and upheaved. The basal rock on the west is the coarse granite above described, which has a great extension to the north and northwest, and appear generally to be gold bearing, as, for example, at the Mammoth and at Goldfields. In the Greaterville region this granite has a very massive flanking on the east of a coarse conglomerate of granite fragments, indicative of a stupendous current of water from the west eastward and at the same time showing that at an early period of the history of the continent there were shallow seas and shore lines in the region of Arizona. Other and different conglomerates farther north and south bear abundant testimony to the truth of the same general statement. Arizona was largely above water in the earlier ages. This granite conglomerate seems local. It requires further study. It is overlain by quartzites and limestones, and probably unconformably, yet it is not certainly older, for masses of quartzites have been noted in its midst. It is, however, auriferous. Small seams of quartz are numerous, and in some of them coarse gold can be seen. The extensive degradation of such rock would liberate a large amount of gold, and this formation, together with other quartz veins, may be the source of the gold of the Greaterville placer. (See under Placers, chapter on gold.) Directly above the quartzite and red beds there are heavily bedded limestones, which at Greaterville and Deerings Camp are fossiliferous. I collected corals and brachiopods representing the Silurian age. A well-defined and nearly vertical fault dislocates the red beds near to Deerings Camp.

SANTA CATALINA MOUNTAINS.

This massive range of mountains bounds the view from Tucson across the broad mesa northward. It is one of the most marked and extensive of the many mountain groups which form the diversified topography of Arizona. As seen from Tucson or the plain on which the university stands, its general directions appear to be east and west, for it stretches wall like for some 10 or 15 miles approximately in that direction, but if followed around its western extremity a northerly or northwesterly trend becomes apparent, and it may be followed up the Cañada del Oro for some 30 miles in that direction to and beyond Oracle, just over the line in Pinal County. The range is rugged and precipitous, especially upon the northern face of the ridges, due to the peculiar layering of the rocks. The highest and chief ridge culminates in Mount Lemon, the summit of which is reported to be about 10,000 feet above tide, or about 7,600 feet higher than the plain of Tucson. And the high ridge reaches its greatest elevation in Mount Rice. The higher ridges and summits are favored by snow falls in winter and an abundant precipitation during the season of summer rains. These higher ridges are thus covered with vegetation and support forests of splendid furs and pines, some of the trees attaining a diameter of more than 3 feet at the base of the brink. But the precipitation is not sufficient to maintain large flowing streams descending to the surrounding plains, except for a short time during the periods of excessive rainfall on the summits or when a heavy snow fall in winter is rapidly melted by the ardent rays of an unclouded Arizona sun.

The geologic structure of the central mass of the Santa Catalinas is but little known. The southern flanks, sloping off into the great mesa of Tucson, are made up of tabular gneiss in such regular strata as to look at a distance like ordinary mechanically formed sedimentary sandstones. The planes of stratification are flat, not in curves or folds. In this respect they are peculiar and almost unique. The low angle of dip and the tabular form both indicate very little disturbance since their deposition. The formation is very thick. It is penetrated by tabular sheets of granitic rock. Large portions of the gneiss contain feldspathic nodules enfolded in the micaceous layers, giving the appearance of a porphyry like our "bird's-eye porphyry" of the prospectors, and entitling the rock to the name of augen gneiss. Other layers are quartzose, sandy, and seemingly are quartzites or old sandstones. The whole series is ancient. I refer them to the Archæan.

On the extreme northeastern flank of the range there are coarse conglomerates made up of thoroughly well-worn bowlders and pebbles, in which white quartz predominates, thus indicating extensive mineral shore-line eruption and deposition. The Palezoic beds are there developed; also a broad scale, with thick deposits of red sandstone and shales—the Devonian or older and fossiliferous limestones above elsewhere noticed.

Crystalline limestone in the form of statuary marble may also be found, and near Johnson's rancho, in the gulch, there are very interesting croppings of the Arizonian slates in a greatly compressed and contorted condition, showing sharp zigzag foldings and crumplings, evidently the result of intense lateral pressure.

Some deposits of copper ore are being prospected in different parts of this range and in the adjoining spur or branch known as the Rincon Mountains, lying northeasterly from Tucson.

THE NATURAL BRIDGE OF ARIZONA.

The remarkable natural formation of a chasm spanned by a rock bridge is one of the wonders of the world, and it far exceeds the natural bridge of Virginia in extent and grandeur. The bridge spans Pine Creek, one of the tributaries of the Upper Verde River, in Gila County, in the extreme northwest corner of Tonto Basin and about 4 miles from the town of Pine. A description of this natural bridge was given by Patrick Hamilton in his book upon Arizona, with a full-page lithographic illustration (p. 136), but I subjoin a more recent description, giving an account of a visit to the bridge, by Mr. Harry G. Logan, one of the students of the University of Arizona.

"Pine Creek at the bridge flows in a canyon with steep sides. Arriving at the brink of this canyon we see before and below us a nearly level flat of land some 5 or 6 acres in extent, reaching across the canyon to the opposite side, where there is an abrupt wall of rocks, the face of a mountain perhaps 1,500 feet high. Standing on this level tract of land, on which there are buildings, an alfalfa field, and an orchard, it is hard to believe that we are on the top of a natural bridge across a chasm and that the stream flows below us. But, looking to the right and to the left, as we face the precipitous bluff, we see the open canyon, perhaps 300 or 400 feet wide and 250 feet deep. The height of the bridge lessens as we approach the opposite side, and at one place there is a hole in the apparently solid rock through which one can look down for 126 feet to the bottom of the canyon.

"Desiring to get under this wonderful bridge, we take a trail to the left and note that the rocks lie in great benches or strata, like cave-like openings extending backwards into the buttresses of the bridge. Entering one of these openings and crawling sometimes upon our hands and knees we find a cave or vaulted chamber with beautiful translucent stalactites pendant from the ceiling and reaching nearly to the floor. These stalactites are resonant when struck, giving off musical notes. This cave is the abode of numerous bats and they made it uncomfortable for us to remain, so we descended to the bottom of the canyon where there is a pool of water 20 to 30 feet across and said to be over 50 feet deep. The opposite buttress or wall of the bridge is nearly perpendicular."

Other caves along the canyon give evidence of the flow of water carrying lime in solution, for twigs, grass, and other substances lying in the water are now covered with a crust or deposit of lime. The rocks of the canyon appear to be chiefly limestone.

Theorizing upon the origin of the bridge we may suppose that the springs and streams of calcareous water have gradually deposited lime in greater quantity above than below, and have in the lapse of time built out or cemented together the rocks and débris of the canyon until a firm cemented mass was formed under which the water cuts its way. Fossils obtained from the limestones of this locality indicate the period or age of the Lower Carboniferous limestone.

MESA FORMATION, TUCSON.

The mesa upon which the University of Arizona is located consists chiefly of horizontal deposits of washed gravel and sand derived from the breaking down of granite and gneissic rocks. The nature of the fragments indicates that they came from the canyons and cliffs of the Santa Catalinas and the Rincon Mountains. It is more than probable that a large part of the deposits came from the Sabina Canyon, the largest and most important drainage canyon from the Santa Catalina range, but at a remote period, when the rainfall was far greater than at present. In sinking a well to obtain water just north of the northwest corner of

the university tract to a depth of 85 feet the following succession of layers were cut through:

Section of the mesa formation.

	Feet.
Thin, sandy soil, 8 to 12 inches, then caliche and pebbles, hard cement	6
Coarse gravel, granitic	6
Sand and water-worn bowlders	6
Red and clay-like earth	2
Red sand	2
Soft caliche, a calcareous cemented mass	2
Hard sand	6
Hard sand and gravel	3
Sand, cemented and aggregated in lumps	11
Red clay	3
Red clay and sand	30
Sand and bowlders	8½
Water in sandy layers	3½

Most of the closely cemented sand and gravel not enveloped in caliche is well filled with small, sparkling crystals of calc spar, which appears to be the cementing material holding the grains of sand together.

TRIASSIC FORMATION.

I have elsewhere mentioned the probability that the red sandstones of the Salt River Valley at McDowell Mount and near Phœnix are probably of Triassic age. Dr. J. F. Blandy in 1893 published a note upon the occurrence of the Trias in southwestern Arizona (Engineering and Mining Journal, November 4, 1893), and informs me that since then he has found remnants of the Cretaceous in places, but particularly in the Date Creek Valley west of Congress.

ANCIENT CHANNEL OF SALT RIVER.

There are good evidences that at a former period of the later ages of the earth's history, but possibly before the creation of man, the Goldfield region east of Mesa was the channel through which a greater part of the ancient floods now represented by the Salt River flowed westward. The chief fact in evidence is the presence upon the higher mesas and hills of drifted river gravel, so much rounded and water worn as to prove its transportation by water currents from remote sources, and at the same time showing by the composition of this rounded gravel its source in hills and mountains far to the eastward, and at the sources of the Salt River and the Gila. Among this transported gravel we find bowlders of the same peculiar kind of slate or sericite-schist as forms the bulk of the high mountains known as the Four Peaks, which rise majestically in the west and north. It is probable that before the Salt River had cut its way to its present low channel a part at least of the drainage was through this open gateway to the west. It should also be noted that the volcanic tufa which now surmounts the hills also contain considerable quantities of similar slate, lending strength to the belief that these sediments also were laid down by great currents of water sweeping westward from the Four Peak region.

GEOLOGY OF THE SUPERSTITION MOUNTAINS.

The Superstition Mountains, rising about 20 miles east of Mesa, and lying between the Gila and Salt rivers, are not, as usually shown, one continuous range extending north and south. The name should be restricted to the east and west line of table-topped hills extending along the road from Mesa to Pinal. Instead of a continuous range beyond these hills on the north there is a broad, open basin-like valley to which the name Goldfields has been given. It is an open space between mountains on each side, and has the general elevation of 2,300 feet or 1,000 feet above Mesa City. The hills on the north side of this valley rise from 500 to 1,000 feet higher, and are formed of volcanic tufas and rhyolitic lavas laid down upon a granitic foundation. So also are the summits of the hills on the south side volcanic in origin, but are harder and more porphyritic and basaltic. The general dip of all these beds of plutonic origin is to the eastward. The floor or foundation of the whole region is a coarse-grained and porphyritic granite. The distinct feldspar crystals are generally from half an inch to an

inch in diameter. The mica is biolite, in fine, irregular scales and evenly spread. The rock weathers freely and does not appear in bold ridges of a rugged aspect, but the surface is smooth and rounded.

It is the ancient foundation arch and appears to extend northward to and beyond the Salt River, for the same kind of rock is found at the head of the Consolidated Irrigation Canal, where the Salt River comes through the mountains. It there forms the two sides of the arch, cutting through which the water of the canal is taken out. This granite has at least two interesting peculiarities. It is water bearing to an unusual degree in the Goldfield region, and is also auriferous to a large extent.

HILLS SOUTH OF MESA.

From Mesa southward the country is open to the Gila in some directions, and in others is interrupted by low ranges and buttes rising isolated above the plain like islands from an ocean. One of these buttes on the right bank, or the north side of the Gila and in the Indian reservation 20 miles or more south of Mesa, was visited and was found to be made up of the ancient mica-slate formation—the Arizonian, probably the equivalent of the Huronian. The slates are much crinkled and contorted, together with numerous thin-bedded layers of quartz. The general direction of the lamination is north 10° west. The relics of an ancient canal just north of this butte, and evidences of aboriginal dwellings, show that the place formerly had a large population. The direction of the bedding or laminations of the mica-slate rocks is not in any way favorable to artesian conditions, trending as it does nearly at right angles with the general descent of the valley, unless we may regard the formation as indicative of a rugged underground topography, rising in underground ridges across the valley, tending to throw any underground flow toward the surface.

SOFT TUFA, TUCSON MOUNTAINS.

The white, soft rock underlying the inclined capping of volcanic rock lying to the east and north of the Yuma mine is a very remarkable mineral aggregate. Its general aspect is that of a granular granite a granutite. But large portions of the weathered rock are reduced to a powdery mass, like a pile of ashes or dry clay and sand. It is not easy to secure masses large enough for specimens that will hold together for transportation. Such specimens, on examination, prove to be distinct mechanical aggregates, made up chiefly of granite débris with small included fragments of red and gray siliceous pebbles. Biotite mica, in small but sharp and brilliant hexagonal plates, is abundant. The siliceous, feldspathic, and other grains are firmly cemented in place by a gray or white magma, which is neither calcareous nor siliceous, but is felicitic and fusible. The whole mass is slightly cavernous and porous, and the cavities are lined with small crystals, apparently of albite. Little siliceous pebbles when broken out leave a cast of their form in the magma. Surface specimens are often incrusted by thin layers or deposits of lime carbonate, a superficial and exotic accumulation very common on the rocks of the region and in the seams or crevices of the croppings. In this peculiar aggregation we have apparently all the constituents of an albitic granite in a comminuted condition, which mixture under favorable conditions of moisture and pressure might readily assume the crystalline condition of a normal granite or granulate.

We must assume that this rock has resulted from the breaking up and destruction of a previously existing granitic mass by active volcanic agencies. It may be called a feldspathic or albitic tuff, but it is very different in its composition from the light-colored tuffs near Tucson. Its position is similar, being underlain and overlaid with plutonic beds of stratified red-brown and chocolate-colored porphyries, but the beds are not horizontal or nearly so as at Tucson. They are uplifted and dip at low angles to the northeast. And at Tucson the overlying plutonic beds are more modern and lava-like in aspect and are full of amygdaloidal cavities, indication of surface flows.

In both localities the underlying beds of soft, white tufa have, in a large measure, determined the topography of the region, for by yielding readily to eroding agencies the harder overlying beds have been undermined and left unsupported, have broken off at the edges. In the croppings northwest of Tucson the constant caving down of the underlying soft, white strata is shown by the numerous slips, leaving a white track in the soft slopes.

THE SOILS OF ARIZONA.

All soils are derived primarily from the decay or decomposition of rocks, or from the abrasion and breaking down of rock masses, by the various mechanical eroding and chemical agencies constantly acting upon them. Soils are thus as varied in their chemical composition as the rocks from which they are derived. Granitic rocks produce granitic soils; volcanic rocks, volcanic soils; sandstones give sandy soils. But all have been more or less modified by the sorting action of water, which separates, to a great extent, the fine particles from the coarse. The detritus brought out from the steep, rocky gorges of the mountains is coarser than the materials transported by the slower flowing streams of the valley lands. The rushing torrents from the mountains bring down large bowlders and gravel. As such floods spread out at the mouths of canyons, and the volume and speed are checked, the larger masses of rock are dropped, and gradually fan-shaped slopes are built up around the mountains, while the finer materials are swept onward to the lower and more nearly level lands.

Thus, as a general rule, the soils of a region partake of the nature of the adjacent mountains, the coarser and more rocky soils being highest and nearest to the parent ridges, while, as the slope lessens, the soil materials are finer, but do not necessarily differ greatly from the coarser in their chemical composition.

The soils of the great Salt River and Gila valleys are not local in origin. They are the result of the eroding and transporting agencies of the rivers which drain the vast region of central, northern, and eastern Arizona. Both the Gila River and the Salt River and their tributaries are but remnants of more powerful streams, which once swept over the region and filled the valley with débris. It is to those earlier rivers we owe the extended plains and mesas now above the reach of the highest floods of the present period. The ancient floods brought with them contributions of gravel, sand, and salt from the mountains far away at their sources. And, as in the mountain ridges so laid under contribution there was a great variety of rocks, both crystalline and sedimentary—granitic, volcanic, limestones, sandstone, and slates—so the fragments torn from their flanks were varied in composition, and gave soils with a great variety of constituents. To these constituents, made up of the trash from distant mountains, we add those derived from the nearer ridges and from local-drainage flows—such, for example, as the slopes and mesas formed chiefly by the Hassayampa, the Agua Fria, Cave Creek, and the Verde. The comparatively local wash from the granitic area of gold field east of Mesa has also had a marked influence upon the nature of the soils lying directly west of it.

Prof. Robert A. Forbes, chemist, and now the director of the agricultural experiment station of the university, Tucson, has made an exhaustive study of the soils of the Salt River Valley, and has reported the results in one of the station bulletins. After giving in detail the results of the analysis of twenty-one different samples, he states the general results, as follows:[1]

"Considering the more critical plant foods in order, it is observed, first, that lime averages no less than 2.372 per cent for the twenty samples from the valley, and is mostly in the form of the carbonate, which is so useful for the flocculation of clay soils and their consequent improvement in tilth. In arid regions this is a fortunate compensation for the small amounts of humus which prevail. In humid regions the situation is reversed. Lime being present in but small amounts in such soils tilth is more largely influenced by humus, which is found most abundantly in damp, cool situations.

"The abundance of lime is characteristic of arid regions, and is one reason for the fertility of these soils under irrigation, since this substance not only improves the physical condition, but preserves humus, and renders phosphoric acid and potash more available to vegetation.

"Potash is abundant everywhere, being deficient in not a single case and showing an average of 0.821 per cent, or more than twice what is usually considered essential to fertility. The feldspars which are found in the granites of this region are rich in potash, and by their weathering and decomposition contribute this element of fertility abundantly to the tilth of the valley.

Table of average results.

In fine earth, water free.	Per cent.
Insoluble matter—sand, etc	64.575
Soluble silica, from clay	13.781
Alumina (Al_2O_3)	6.488
Iron oxide (Fe_2O_3)	4.922

[1] Salt River Valley Soils, Bulletin No. 28.

	Per cent.
Organic and volatile matter	8.569
Lime (CaO)	2.372
Potash (K_2O)	.821
Soda (Na_2O)	.425
Magnesia (MgO)	1.835
Manganese oxide (Mn_3O_4)	.055
Phosphoric acid (as P_2O_5)	.130
Sulphuric acid (as SO_3)	.059
Carbonic acid (as CO_2)	1.025
Chlorine	.110
Net total	100.112
Humus	.650
Nitrogen	.045
Alkaline salts	....
Total soluble salts	.167
Sodium carbonate	.044
Sodium sulphate	.030
Sodium chloride	.041

"Phosphoric acid makes a fairly satisfactory showing. The average of 0.13 per cent is somewhat in excess of the necessary amount, and, as stated before, the large percentage of lime associated with it should tend to make it more available. In particular cases these soils are undoubtedly deficient in this element of fertility; such, for instance, are samples Nos. 12, 11, 20, 13, 14, and 1, and it may be something more than a coincidence that Nos. 1, 12, 13, and 20 are from localities where fruit trees are in an unhealthy condition. These soils would quite probably profit by the addition of fertilizers containing phosphoric acid. Commercial phosphates are beyond the reach of most farmers of this region, but phosphoric acid may be supplied, with other needed materials, in barnyard manure. Bat guano also contains much phosphoric acid, our samples showing from 3.36 to 6.91 per cent. It is possible also that the local supply of bones could be ground and treated profitably for this purpose, but some machinery and considerable skill are needed for this work.

"*Zeolites.*—It will be noticed in the table that the soluble silica averages more than twice as much as the alumina (13.781 to 6.433 per cent). This excess of silica suggests the presence of zeolites, since, as Dr. Hilgard points out, the ratio of silica to alumina in pure clay is only about as 46 to 40. The existence of zeolites is further indicated by the fact that lime, magnesia, potash, and soda are far in excess of the amounts necessary to combine with the carbonitic, sulphuric, and phosphoric acids present. The importance of zeolites, as emphasized by Dr. Hilgard, consists in the fact that they are repositories of plant foods, from which, by slow decomposition, these compounds are gradually given up, as needed. The existence of zeolites in large amount, therefore, augurs well for the wearing qualities of soils containing them.

ALKALINE SALTS.

These are not as a rule present in unmanageable amounts, though in connection with heavy soils they occasionally make a good deal of trouble. Just south and southwest of Tempe is a tract of low, heavy land containing an excessive amount of alkaline salts. In its virgin state this tract, which is represented by sample 16, supports a bushy growth of atriplex and a few hardy weeds, but has not been reclaimed for agricultural purposes. An examination of the analysis of soil 16 will show that the alkali in this tract, as indeed nearly everywhere in the valley, is chiefly "white" in character and contains a relatively small proportion of the more injurious sodium carbonate or "black alkali." Consequently these lands must be reclaimed, not by treatment with gypsum, which is an antidote for black alkali, but by drainage and the entire removal of the objectionable salts. The Australian salt bush, which is not only an excellent forage, but grows readily in excessively alkaline soils and removes large amounts of the injurious salts, may also prove useful in some situations hereabouts.

"The silt brought down with the water has a manifest effect upon the physical nature of our irrigated soils, but we have not confirmed the popular notions regarding its fertilizing value by any investigation of its composition.

THE CHIEF DEFICIENCIES OF OUR DESERT SOILS AND SUGGESTIONS FOR OVERCOMING THEM.

"Nitrogen is probably seriously lacking in most of the soils of this valley. The average of 0.045 per cent is low and includes amounts running from 0.029 per cent in soil 4, to 0.108 per cent in soil 16. The smallness of these figures may be seen by comparison with the average amount of nitrogen (humic nitrogen only) in 18 arid soils, stated by Dr. Hilgard at 0.101 per cent ore, more than twice as much as the Arizona average.

"That these soils are nitrogen hungry is indicated also by a leaf-curl disease, which has been noticed among the peaches and apricots on the Phœnix substation by Professor Toumey, who attributes the trouble to a weakened condition resulting from a lack of soil nitrogen.

"The problem of supplying deficient nitrogen is, therefore, a most serious one, inasmuch as nitrogen is the most costly plant food sold in commercial fertilizers. Fortunately, however, a cheap method exists for accomplishing this work, namely, by cultivating leguminous crops upon the land, such as alfalfa, crimson clover, sour clover, cowpeas, vetches, beans, peas, or other members of this class of plants, according to circumstances of climate, water, and soil. These plants, as mentioned before, maintain upon their roots colonies of peculiar bacteria, appearing as small lumps or tubercles, which have power to convert nitrogen from the air into the nitrate form available to vegetation. Upon the decay of the whole plant, which may be plowed under as green manuring, or of the roots and stubble, if the crop is harvested, the nitrogen contained, in combination with humus, remains behind and is available to other crops which have not the power of deriving their nitrogen supply from the air.

"Doubts have been expressed, when alfalfa is cut for hay, that the nitrogen returned to the soil by decaying roots and stubbles make up for that which is taken away from the soil during the growth of the plant; for alfalfa is known to feed upon soil nitrogen as well as that indirectly obtained from the air. Of course, this return will be made, with interest, when the whole crop is plowed under, and the same will be true when it is pastured, the nitrogen being then returned in the excrements of the animals on the ground.

"In Salt River Valley most alfalfa fields have been used both for hay cutting and pasture. In order, therefore, to determine the effect of the prevailing management of this crop upon soil nitrogen samples were taken from nine fields in the valley which had formerly been in alfalfa from five to fifteen years. These samples gave 0.052, 0.073, 0.060, 0.056, 0.090, 0.068, 0.097, 0.095, and 0.115 per cent, respectively, or an average of 0.078 per cent as compared with the average of 0.045 per cent for the virgin soils of the valley, an increase of about two-thirds. It is noteworthy that of the percentages of nitrogen in alfalfa ground, not one falls below the average of that in virgin soils, while in but one case, No. 16, does the nitrogen of virgin soils exceed the average in alfalfa ground. The effect of alfalfa upon soil nitrogen in ordinary practice is therefore sharply marked so far as our observations go.

"The examinations made in the laboratory thus confirm in part the experience of the farmers of southern Arizona as to the most profitable method of handling our desert soils. This consists simply in growing alfalfa upon the ground before attempting other crops. It has repeatedly been stated to the writer by residents of Salt River Valley that orchards, wheat, and various other crops were conspicuously thriftier on old alfalfa ground than on adjacent virgin tracts. It was also observed in 1897, during the work on sugar beets, that the best beets came from alfalfa ground, being richest in sugar and of greatest purity.

ALFALFA IMPROVES THE PHYSICAL CONDITION OF THE SOIL.

"The beneficial effects of alfalfa, however, are due not only to the increase of nitrogen in the soil, but to a great improvement in its physical condition. The compact character of our desert soils is forbiddingly evident to most observers, especially those accustomed to the loose virgin tilth prevalent in humid climates. This denseness and solidity so necessary to overcome is due to various causes. In the first place, alkaline salts, especially sodium carbonate, destroy the flocculated or grainy character of soils, which is chiefly caused by lime. Now, although lime is abundant in this region and the alkali very mild in character, the sodium carbonate present, averaging 0.044 per cent for the valley, undoubtedly contributes materially to the undesirable physical condition of our virgin desert soils. Again, the tremendous though not very frequent downpours of rain which occur throughout southern Arizona, descending upon the bare and nearly unprotected desert,

undoubtedly puddle the soil and pack it into an increasingly solid mass. Finally, the intense and prolonged heat of our summer favors the slow combustion of what little organic matter the soil contains, and thus leaves it nearly without one very efficient cause of good tilth.

"Although the humus of arid regions is generally low, it seems unusually so in southern Arizona. Dr. Hilgard states the average for 813 arid soils from California, Washington, and Montana at 1.84 per cent, while that from 19 samples of Salt River Valley is only 0.65 per cent, or about one-third. This unusual deficiency, together with the peculiar value of humus in an arid region, through its water-holding and tilth-producing powers, makes the problem of increasing its amount a very important one.

"Alfalfa and other green manuring crops and barnyard manure are the chief means at hand for effecting this addition. Alfalfa is particularly mentioned because it is the best known crop for our conditions of soil and climate, but other forage plants are attracting notice. Among these is sour clover (*Melilotus Indica*), which thrives vigorously here. The practice of plowing barley under for green manuring, indulged in by some farmers, is of limited value for the reason that barley does not assimilate atmospheric nitrogen and add it to the soil after the manner of clovers and other legumes.

"Leguminous crops should therefore be chosen for green manuring in this region, and the work of discovering new plants and improving the methods of handling those already known for this purpose is a most important branch of agricultural inquiry with us at the present time.

"Alfalfa in particular, however, improves the condition of our soils in yet another way. The strong numerous roots of this plant penetrate to great depths (about 12 feet in dry soil was observed by Professor Headden in Colorado) and in so doing open up the soil to air and water and prepare the way for the less vigorous roots of other plants. This view of the usefulness of alfalfa is supported by the observation that there are other strong-rooted plants not leguminous in character, and which consequently can not add nitrogen to the soil, whose good effects upon subsequent crops are noticeable. The spiny aster, one of our rankest weeds, and sorghum, which taxes soil severely for plant foods, have both been observed to benefit subsequent crops, for no other apparent reason than the loosening action of their roots upon the dense virgin earth.

A COMPARISON

"Finally, although comparisons are said to be odious they are apt to be instructive, and it may not be amiss to compare the soils of Salt River Valley with those of other arid regions. The following table, compiled from Dr. Hilgard's figures and those of this bulletin effect this comparison:

Comparison by States of arid region soils.

	California.	Washington.	Montana.	Arizona.
Number of soils averaged	198	76	39	20
Insoluble residue	67.882	75.121	66.141	64.575
Soluble silica	8.960	3.673	6.235	13.781
Potash	.644	.777	1.005	.821
Soda	.277	.249	.226	.425
Lime	1.075	1.378	2.483	2.372
Magnesia	1.488	1.171	1.494	1.835
Manganese oxide	.062	.049	.057	.055
Iron oxide	6.303	5.530	4.459	4.922
Alumina	8.721	6.063	7.145	6.433
Phosphoric acid	.083	.173	.178	.130
Sulphuric acid	.048	.028	.029	.059
Carbonic acid	[1] 1.148	.403	2.398	1.025
Water and organic matter	4.396	5.226	7.133	3.569
Chlorine	.....	.....	.....	.110
Total	99.939	99.741	.....	100.112
Humus	1.040	1.155	3.321	.650

[1] Not included in total.

"It appears from this table that in potash, lime, and phosphoric acid, Arizona occupies an intermediate position, being richer usually in these constituents than the average California and Washington soils, but poorer than those of Montana.

"It is noteworthy that in Arizona the amount of soluble silica is remarkably large, being even more than twice the alumina present, while in California and Montana these constituents are about equal, and in Washington the soluble silica is much less in quantity than the alumina. This points to the peculiarly zeolitic character of the soils of Arizona and leads to favorable inferences regarding their wearing qualities, at least so far as mineral ash plant foods are concerned.

"Humus is conspicuously deficient in Salt River Valley. Montana soil contains five times as much humus as those of Arizona. This is doubtless largely due to the temperature, the warmer climate of Arizona favoring the slow combustion of organic matter.

SUMMARY OF RESULTS.

"1. The soils of Salt River Valley, generally speaking, are amply supplied with the more essential mineral ash plant foods, including lime, potash, and phosphoric acid.

2. Nitrogen and humus are undoubtedly deficient in quantity, and the addition of these soil ingredients is desirable, perhaps imperative.

3. Alkaline salts are not prevalent in excessive amount except in occasional localities of limited area. The alkali is very "white" in character, and consequently its injurious effects are minimum.

4. Probably the most serious difficulty with our virgin soils is a physical one. Their dense, compact condition must be remedied by suitable methods of culture.

5. The cheapest and best methods of supplying the lack of humus and nitrogen, and of improving the tilth and water holding power of these soils is by growing leguminous crops upon the lands and plowing them under as green manuring. So far as now known, alfalfa and crimson clover are the best of these, and their use for this purpose is undoubtedly an essential part of any scheme of crop rotation for this region.

"It is proper to note the effect of the annual overflow of the Colorado upon the narrow strip of bottom land bordering its course, and upon the much broader stretches of alluvial lands south of Yuma toward the head of the gulf. The Colorado may be compared to the Nile of Egypt. It is the Nile of America. With its immense drainage area, it lays the table lands and the valleys of the heart of the continent under cultivation, and fetches down the lighter and richer portions of their soils to spread them in successive layers over the bottom lands of its lower valley. The red color of the silt of the Colorado not only gave the river its name, but it tells the geologist of the erosion of the red sandstones formations along its course. But other rocks contribute their quota and make a complex mixture containing all the element essential to plant growth. Such bottom lands are suprisingly fertile. All they require is water to start and sustain a most luxuriant vegetation. And this water the river can supply."

LAW REGULATING THE LOCATION OF MINES.

AN ACT to amend an act entitled "An act concerning mines," being act No. 42 of the eighteenth legislative assembly of the Territory of Arizona, approved March 5, 1895.

Be it enacted by the legislative assembly of the Territory of Arizona, That act numbered forty-two of the eighteenth legislative assembly of the Territory of Arizona, approved March fifth, eighteen hundred and ninety-five, be amended so as to read as follows:

SECTION 1. Every notice of location of a lode mining claim shall contain, first, the name of the claim located; second, the name of the locator; third, the date of location; fourth, the number of feet in length of said claim and the number of feet claimed on each side of the center of the discovery shaft, lengthwise of the claim; fifth, the general course of the lode, deposit, or premises located; sixth, the locality of the claim with reference to some natural object or permanent monument that will identify the claim; and shall be filed with the county recorder for record within ninety days after same shall have been located.

All lode-mining locations hereafter located, the certificate of location of which shall not contain, first, the name of the lode or premises; second, the name of the locator or locators; third, the date of the location; fourth, the number of feet in length of said claim, and the number of feet claimed on each side of the center of the discovery shaft, lengthwise of the claim; fifth, the general course of the lode or premises, as near as may be; sixth, the general locality of the claim with reference to some natural object or permanent monument that will identify the claim, shall be void.

Before filing such location certificate with the county recorder of the proper county the discoverer shall locate his lode claim by, first, sinking a discovery shaft upon the premises so claimed to a depth of at least ten feet from the lowest part of the rim of said shaft at the surface, and deeper, if necessary, until there is shown by such work or lode deposit or mineral in place; second, by posting at the point of discovery on the surface a plain sign, or notice, substantially conforming to the location certificate; third, by making such claim or premises on the ground so that its boundaries can be readily traced.

Such surface boundaries shall be marked by eight substantial posts projecting at least three feet above the surface of the ground, or by substantial stone monuments at least three feet high, to wit: One at each corner of said claim and one at the center of each end and side line thereof.

Any open cut, adit, or tunnel which shall be made as above provided for as a part of the location of a lode-mining claim, and which shall be equal in amount of work to a shaft ten feet deep and four feet wide by six feet long, and which shall cut a lode or mineral in place at a depth of ten feet from the surface, shall be equivalent as a discovery work to a shaft sunk from the surface.

The discoverer shall have ninety days from the date of discovering the lode and the posting of the notice thereon to perform said discovery work thereon.

If at any time the locator of any mining claim heretofore or hereafter located, or his assigns, shall learn that his original certificate was defective or that the requirements of the law had not been complied with before filing, or shall be desirous of changing his surface boundaries or of taking in any additional ground which is subject to location, or in case the original certificate was made prior to the passage of this law, and he shall be desirous of securing the benefits of this act, such locator or his assigns may file an amended certificate of location subject to the provisions of this act regarding the making of new locations.

The amount of assessment or representation work or improvements to be done or made during each year after the completion of the location as heretofore provided, and the time for doing the same shall be as provided by the laws of the United States.

Within three months after the expiration of the period of the time fixed for the performance of annual labor or the making of improvements upon any lode, mining claim, or premises the person on whose behalf such work or improvement was made, or some person for him knowing the facts, may make and record in the office of the county recorder of the county wherein such claim is situated an affidavit in substance as follows:

Territory of Arizona, county of ———, *ss.*:

———— ————, being duly sworn, deposes and says that he is a citizen of the United States and more than twenty-one years of age, and resides at ———, in ——— County, Arizona Territory, and is personally acquainted with the lode, mining claim, and premises known as ——— mining claim, or lode, situated in ——— mining district, Arizona Territory, the notice of which premises is recorded in the office of the county recorder of said county in book —— of records of mines, at page ——, that between the —— day of ———, A. D. ——, and the —— day of ———, A. D. ——, at least ——— dollars' worth of work and improvements were done and performed upon said premises or lode, not including the location work of said claim. Such work and improvements were made by and at the expense of ———, owners of said premises, for the purpose of complying with the law of the United States pertaining to assessments or annual work, and (here name the miners or men who worked upon the claim in doing the work) were the men employed by said owner, and who labored upon said premises and who did said work and improvements, and said work so done upon said premises is described as follows, to wit: (Here describe the work done.)

Signature ———— ————

Subscribed and sworn to before me this —— day of ———, A. D. ——.
My commission as notary public expires on the —— day of ———, A. D. ——.
[NOTARIAL SEAL.]

———— ————,
Notary Public.

Such affidavit when recorded shall be prima facie evidence of the performance of such labor or the making of such improvements, and said original affidavit after it has been recorded or a certified copy of record of same, or the record of same, shall be received as evidence accordingly by all the courts of this Territory. The relocation of forfeited or abandoned lode claims shall only be made by sinking a new discovery shaft and fixing new boundaries in the same manner and to the same extent as is required in making a new location, or the relocator may sink the original discovery shaft ten feet deeper than it was at the date of the commence-

ment of such relocation, and shall erect new or make the old monuments the same as originally required. In either case a new location monument shall be erected, and the location certificate shall state if the whole or any part of the new location is located as abandoned property.

SEC. 2. The locator of a placer mining claim shall locate his claim in the following manner: By posting a notice of location thereon containing the name of the claim, the name of the locator or locators, the date of location, and the number of acres claimed; by marking the boundaries of his claim with a post or monument of stones at each angle of the claim located. When a post is used it must be at least four inches square by four feet six inches in length, set one foot in the ground and surrounded by a mound of stone or earth four feet in diameter by two feet in height.

Where it is practically impossible, on account of bed rock or precipitous ground, to sink such posts, they may be placed in a pile of stones. And if for any reason it is impossible to erect and maintain a post or monument of stone at an angle of such claim a witness post or monument may be used, said witness monument to be placed as near the true corner as the nature of the ground will permit. When a mound of stone is used it must be at least three feet in height and four feet in diameter at the base.

The locator of any placer claim shall, within sixty days after the date of location of such claim, have the location notice of said claim recorded in the office of the county recorder of the county in which said placer claim may be situated, which record must contain the name of the claim, designating it as a placer claim, the name of the locator or locators, the date of such location, the number of acres thus claimed, a description of the claim with reference to some natural object or permanent monument that will identify the claim. Any record of location of a placer mining claim which shall not contain all the requirements of this section shall be void.

SEC. 3. If at any time the locator of any placer-mining claim heretofore or hereafter located, or his assigns, shall learn that his original location notice was defective, or that the requirements of the law had not been complied with before filing, or shall be desirous of changing his surface boundaries, or of taking in any additional ground which is subject to location, or in case the original notice of location was made prior to the passage of this law, and he shall be desirous of securing the benefits of this act, such locator or his assigns may file an amended notice of location subject to the provisions of this act, regarding the making of new location.

SEC. 4. The amount of assessment work or annual labor or improvements to be done or made during each year shall be as provided in the laws of the United States.

SEC. 5. Within three months after the expiration of the time fixed by law for the performance of assessment work or annual labor, or the making of improvements upon any placer mining claim, the person on whose behalf such work or improvement was made, or some person for him knowing the facts, may make and cause to be recorded in the office of the county recorder of the county wherein such claim is situated an affidavit in substance as follows:

Territory of Arizona, county of ——, *ss:*

——— ———, being duly sworn, deposes and says that he is a citizen of the United States and more than twenty-one years of age, and resides at ———, in ——— County, ——— of ———, and is personally acquainted with the placer-mining claim and premises known as ——— placer-mining claim, situated in the county of ———, Territory of Arizona, the notice of location of which placer-mining claim is recorded in the office of the county recorder of ——— County, in book —— of records of mines, at page ——; that between the —— day of ———, A. D. ——, at least ——— dollars' worth of work and improvements were done and performed upon said placer-mining claim. Such work and improvements were made for and on behalf of ———, who are the owners of said placer-mining claim, and said work so done upon said placer-mining claim is described as follows, to wit: (Here describe the work done.)

Signature ——— ———.

Subscribed and sworn to before me this —— day of ———, A. D. ——.
[NOTARIAL SEAL.]

———— ————,
Notary Public.

SEC. 6. Such affidavit when so recorded, or the record thereof, shall be prima facie evidence of the performance of such labor or the making of such improvements and said original affidavit, after it has been recorded, or a certified copy of the record of same, or the record thereof, shall be received as evidence accordingly in all the courts of this Territory.

SEC. 7. That placer mining locations heretofore made since the passage of the act of March fifth, eighteen hundred and ninety-five, the locations of which have not been in conformity with said act, shall not be held to be void by reason thereof.

SEC. 8. All acts and parts of acts in conflict with the provisions of this act are hereby repealed.

SEC. 9. This act shall take effect and be in force from and after its passage.

Approved March 2, 1899.

CLIMATE OF ARIZONA.

The following is by W. L. Woodruff, M. D., Phœnix:

Arizona is a vast Territory mostly embraced in the Rocky Mountain plateau and presents physical features found in no other subdivision of the United States. With an extreme breadth of 335 miles from east to west and length from north to south of 400 miles, with snow-capped mountains of great elevation at the north and east, dropping to sandy deserts which extend down to sea level and from the shores of a vast tropical sea with an area of 53,000 square miles at its southwest corner, one will find within its confines any desired climate.

With this great diversity of physical and climatic conditions, it is no wonder that the climate of Arizona is as little understood as are its unlimited mineral deposits, its inexhaustible soil, and its capacity to produce and mature almost every known plant of the temperate and semitropic zones alongside of fruits heretofore grown only in the tropics. Within the borders of this Territory is reproduced in miniature almost every climatic and physical feature of the North American continent, and its diversified products are here brought to as high a state of perfection as in their native location.

That the diverse climatic and physical conditions of this unique corner of the earth may be better understood, Mr. William G. Burns, section director of the Phœnix weather bureau, has set off the Territory into three divisions, cutting off the western 80 miles by the one hundred and thirteenth degree of longitude, throwing the counties of Mohave and Yuma to the west of that line. He then separates the remaining portions into the northeastern and the southeastern divisions upon the line of the thirty-fourth degree of north latitude. For the year 1898 four stations, two in each county of the western division, gave a mean temperature of 68.90 degrees; six stations in the northeastern division gave a mean temperature of 52.03 degrees, while twenty-two stations in the southeastern division gave a mean temperature for the year of 64.01 degrees.

Much of the land in the western division does not exceed 500 feet above sea level, is practically a continuation of the Mohave Desert in California, and essentially tropical. This region is free from frost, is quite dry, and when irrigated from the Colorado River, which forms its western boundary, or its tributaries will be found almost unlimited in fertility and in the production of tropical plants. The tillable lands will be found mostly in the valleys. Much of the surface of these two counties is covered by broken mountain ranges reaching, of course, a much greater altitude and abounding in many localities with mineral wealth. As the altitude increases, naturally the weather, both winter and summer, becomes cooler.

The northeastern portion, with Prescott as its principal city, and Jerome, Flagstaff, Kingman, Williams, and Holbrook important shipping points, consists of high mountain ranges and table-lands ranging in altitude from 3,000 to 13,000 feet. In summer the climate of these higher valleys and plateaus is mild and invigorating, with scarcely a day too warm for heavy clothing and never a night when blankets are not a necessity. The valleys and lower mountains are usually covered with green vegetation. Here the apple grows to perfection, also all other fruits and plants indigenous to New England or the northwest. In this region are located immense pine forests, and at no great distance as the eye wanders to the highest mountain peaks in plain view are seen regions of almost perpetual snow.

The southeast corner of Arizona, embracing the counties of Gila, Graham, and Cochise, is in surface and climate quite similar in general characteristics to the region just described, but considerably warmer in summer and with less snow in winter. During four months of the year, except in the deeper valleys, much of this region is under a blanket of snow varying from a few inches to several feet in depth. This whole elevated country of about 60,000 square miles, with its vast snow fields and an annual precipitation of from 20 to 50 inches, is one of the features which contribute to produce the possibilities of the remaining portion of the Territory.

The altitude of south central Arizona, composed of the counties of Maricopa Pinal, and Pima, has an altitude ranging from 500 to 2,500 feet above sea level

and a semitropic climate that is fast becoming famous the world over. I have heretofore attempted to describe it in the following language:

"This part of Arizona is divided into high mountain ranges, varying from 2,000 to 6,000 feet in elevation, gradually degenerating into foothills, valleys, and tablelands, usually called mesas. The valleys and mesas vary in elevation above sea level from 109 feet at Yuma to 1,100 feet at Phœnix and 2,400 feet at Tucson. In the valleys, lower mesas, and foothills we find the mild, salubrious climate that is fast making the Salt River Valley famous as the world's greatest sanitarium. This is more or less true of all the southwestern quarter of Arizona. Southern Arizona has been compared to Persia. If southern California is our Italy, southern Arizona is our Persia—in soil, in climate, in productions, and in the character of its landscape. It is much more like Persia than it is like any other locality in the United States, and in the next ten years it may well show the world what Persia might have been about the dawn of the twentieth century if it had fallen into the hands of the Anglo-Saxon. The date and lemon, the fig and pomegranate flourish in this region perfectly ripened every year, and undoubtedly the lemon reaches greater perfection in the Salt River Valley than in any other place in the United States if not in the world.

"It is in the Salt River Valley, with Phœnix as its center, where these unique climatic conditions exist in greatest perfection, although at Tucson and other localities in Pima County the climate is very similar, with a lower average temperature in the summer. Phœnix is the center of population and of cultivation of the soil, both agriculturally and horticulturally. Here human health and bountiful fruit production go hand in hand. The same causes that produce the one are always thriving under nature's programme to promote the other."

The details of climatic phenomena will appear from the following table of the Weather Bureau's climatological data for Phœnix, Ariz., for the year 1898:

Months.	Temperature.															
	Mean.				Extreme.		Mean.			Normal.	Mean.					
	Dry bulb.		Wet bulb								Above.					
	8 a.m.	8 p.m.	8 a.m.	8 p.m.	Highest.	Lowest.	Maximum.	Minimum.	Monthly.		Below 32.	41	50	59	68	77	90
January	40	54	35	44	73	23	58	36	47	49	0	23	10	3	0	0	0
February	47	70	40	52	81	36	74	44	59	54	0	28	28	13	0	0	0
March	46	68	38	49	83	33	71	43	57	61	0	31	27	10	0	0	0
April	59	83	48	58	102	41	87	57	72	67	0	30	30	28	19	7	0
May	60	86	48	58	99	48	88	59	73	75	0	31	31	31	24	8	0
June	70	98	55	66	110	57	100	69	85	83	0	30	30	30	30	29	8
July	81	102	68	72	111	73	104	80	92	90	0	31	31	31	31	31	18
August	80	98	68	72	109	71	101	78	90	88	0	31	31	31	31	31	15
September	70	96	58	66	106	64	99	69	84	81	0	30	30	30	30	30	0
October	57	83	43	57	99	47	89	54	72	69	0	31	31	31	24	3	0
November	45	66	37	49	80	30	73	42	57	58	0	30	25	11	2	0	0
December	41	55	36	44	73	28	61	37	49	53	0	28	15	0	0	0	0
Year	58	80	48	57	111	23	84	56	70	69	0	354	319	249	191	139	41

Months.	Precipitation.		Mean relative humidity.	Weather.				Percentage of possible sunshine.	Average hourly velocity wind.
	Total.	Normal.		Clear.	Partly cloudy.	Cloudy.	.01 inch and over.		
January	1.63	0.57	56	15	6	10	7	62	4.1
February	T.	.89	41	20	7	1	0	88	3.3
March	.03	.68	33	19	9	3	2	82	4.9
April	.18	.30	30	22	5	3	2	86	4.9
May	.01	.16	27	24	6	1	1	90	4.4
June	.08	.07	25	24	5	1	2	89	4.1
July	.24	.85	37	22	8	1	2	80	4.7
August	1.03	.97	44	15	12	4	9	74	4.6
September	.04	.54	32	29	1	0	1	98	4.5
October	.00	.62	23	25	4	2	0	95	3.8
November	1.01	.44	35	24	4	2	3	92	3.7
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The Flora of Arizona.

There are but few States in the Union that have a more varied flora than Arizona. The Sonorean character of much of the southern portion of the Territory, with a maximum amount of sunshine and a minimum rainfall, is productive of vegetation not found elsewhere in the United States. The high plateau of the north and numerous mountain ranges which break the surface of our southern plains, ranging from a few hundred to 13,000 feet above sea level, are productive of all degrees of climate, from the extreme heat of the lower valleys to that found at the summit of the San Francisco Mountains, where snow banks remain as late as August. Going hand in hand with this variation in climate is an equal variation in plant life.

The flora of the Colorado Plateau, and to a considerable extent of the many mountain ranges south of this plateau, is strikingly similar to that of southern Colorado and Utah. Here, among trees, are found pines, junipers, oaks, firs, balsams, and poplars. At the higher elevations the valleys are usually well covered with perennial grasses.

All of southern and central Arizona, with the exception of the higher mountains, has a flora entirely different. Succulent plants, including cacti, yuccas, and agaves, are here the most conspicuous forms of plant life. The plains are for the most part more or less thickly covered with a great variety of shrubs and bushes, in the protection of which many annuals and the weaker perennials find a home. Many of these shrubs enter largely into the forage of southern Arizona, and in many seasons of extreme drought to a great extent take the place of the grasses, other annuals, and small perennials which under normal conditions constitute the greater portion of our forage. The greasewood or creosote bush grows in abundance on the driest of our plains, and is the most conspicuous and widespread shrub of the Territory. The water courses are lined with quite a variety of trees, the mesquite, cottonwood, willow, sycamore, and ash being the most abundant and, in the order named, probably of greatest economic importance.

At first sight there is a wonderful sameness about the flora of the plains, which has not escaped the notice of casual observers. The uniform sage-green character of the foliage, with the great preponderance of red and yellow flowers, argues to the unscientific mind but few species. This is a misconception, as the flora of the plains is an exceedingly varied one, the great number of species only resembling each other in color of foliage and in other superficial characters. The monotonous character of the flora disappears in a great measure when on examination these plants, so uniform in general appearance, are found to include a large number of genera and species only differing from one another in the small variations compatible with their environment. These plants as a rule have diminutive or no leaves; hence the evaporating surface is brought down to the minimum. During the rainy season the tissues become gorged with water, which they retain with wonderful tenacity, enabling them to withstand many months of continuous drought.

The plants of the plains are usually covered with thorns and spines, or the surface of the leaves and younger stems are covered with resins and other protective agents. They have become toughened and hardened by generations of exposure to heat and drought, and are able to withstand the direst vicissitudes of their nativity.

The mountain flora shows a marked contrast when compared with the flora of the plains. The greater variations in the color of flowers and fruits, the deeper green of the foliage, and the larger leaves, reminds one of the flora of humid regions. This difference is due to the usual greater precipitation in mountainous regions and the higher elevation being productive of a slower evaporation.

The timber of the Territory practically belongs to the mountain flora; however, a large number of both deciduous and evergreen trees are scattered over the foothills and along the river courses of the southern plains.

A number of indigenous plants—a list much too long to enumerate here—have a local reputation for their medicinal qualities, many of them being kept for sale in our drug shops. It seems not at all improbable, on investigation, that in some of these will be found meritorious qualities which will give them a permanent place in our pharmacopœia.

The greater number of our weeds, and all of our more injurious ones, are introduced plants that do not properly belong to our flora.

The value of canaigre, a plant indigenous to southern Arizona, is already quite beyond the experimental stage, and bids fair to prove in the near future of considerable commercial importance as a source of tannic acid.

NATIVE GRASSES OF ECONOMIC IMPORTANCE.

The soft and succulent grasses of the Eastern and Central States in Arizona give place to a great variety of grasses with short, rigid leaves, and hard stems or culms. These grasses are eagerly eaten by stock, and as a rule contain a much higher percentage of nutritive matter than the grasses of more humid regions. As yet but few of our indigenous grasses, which number nearly 250 species, have been thoroughly tested in cultivation. It is known, however, from their natural environment, that many of them will grow with a minimum amount of moisture. Our range grasses may be conveniently divided into two general classes:

First. The large number of species growing along rivers and creeks, in the vicinity of springs and tanks, and in other moist places.

The most widely disseminated of these grasses is the common salt grass. This grass, although inferior to many others, is on account of its abundance the most important forage grass in many of the southern valleys. Two or three large species of the genus Sporobolus, known to cattlemen as Sacaton grasses, are important valley grasses of southern Arizona.

Second. The grasses which grow on the mesas and mountains cover large areas. These grasses are by far the more important, as they constitute the greater portion of the grass forage of the Territory and include those recognized by stockmen as mesquite grass, gramma, needle grass, and gietta. The greater number of these grasses are perennials, having hard, wiry leaves and stems, but very nutritious, and usually well liked by all classes of stock. They grow rapidly after the summer rains and provide fine forage for the fall and winter months.

Much of the fall forage consists of a variety of annual grasses known as six-weeks grass, from the fact that they spring into existence and grow and mature in from four to six weeks. These grasses appear after the summer rains and soon cover the plains with a more or less luxuriant growth of valuable forage. Drying on the ground and containing an abundance of seed, they retain a high percentage of their nutritive qualities for months after maturing and are a large part of the forage during the winter months.

The frequency of the summer rains during the past two years generally throughout the Territory and the greatly diminished number of cattle on the range have brought the natural pasturage into better condition than it has been for several years, so far as grass forage is concerned.

Overstocking has a tendency to kill out the better grasses, and when this is augmented by one or more dry seasons the range is several years in regaining its normal condition. Many of our grasses grow in isolated bunches or scattered about here and there, only a few culms in a place. These are the grasses that suffer from close cropping, for when the top is continually eaten to the ground no seeds are matured and the roots gradually die or are trampled out by horses and cattle.

FORAGE PLANTS OTHER THAN GRASSES.

Probably in no other portion of the United States do we find so great a variety of plants, other than grasses, which may be properly termed forage plants. In many localities during a portion of the year grasses add but little to the forage. Cattle subsist largely upon the foliage of the mesquite, buck brush, white sage, pig nut, salt bush, and other shrubs and hardy perennials, many of which provide excellent forage.

Several plants belonging to the genus Atriplex, closely related to the celebrated Australian bush, recently introduced into the arid regions of the Southwest for purposes of forage, are abundant throughout south and central Arizona.

The leaves and ripened pods of mesquite are valuable forage. The beans, according to the report of Dr. Lowe, contain about 30 per cent of grape sugar, are very fattening and readily eaten by both horses and cattle.

We have another tree somewhat similar to the mesquite, known as the screw-bean, but smaller and less abundant. In some localities it also provides excellent forage.

During late winter and early spring or in periods of extreme drought, when grasses become scant, the value of this class of forage becomes apparent. It is a means of keeping stock alive and in growing condition, when without it they could not subsist. As the greater number of these plants are evergreen shrubs they are fed upon to some extent during all periods of the year. However, it is only in times of necessity that they become a large feature in range forage.

PALM ROAD, BARTLETT RANCH, MARICOPA COUNTY.

SPECIES OF INDIGENOUS TREES.

Arizona has about seventy-five species of indigenous trees, a number excelled by but few States in the Union. Of this number about half are evergreen, including a large number of species of pine and oak.

We have nine species of oak, ranging in size from a mere shrub to the black oak, which sometimes reaches a diameter of more than 4 feet. On our mountains and high plateaus are found eleven pines, from our large yellow pine to the small nut pine of our southern mountains. Four willows grow along our water courses, and two cottonwoods and an aspen find a home at varying altitudes. Four junipers cover large areas between 4,000 and 6,000 feet, or occur as isolated specimens on the foothills and lower mountains. A spruce, two firs, a balsam, and a cypress mingle with the higher pines, and farther down are found two maples, three ashes, three species of mountain mahogany, two ironwoods, and species each of madrona, juneberry, buckthorn, redbud mulberry, cherry, walnut, sycamore, alder, locust, and hackberry.

The following are more southern species, which extend along the water courses, or are found on the foothills of southern Arizona, viz: Three paloverdes, three arborescent cacti, and one species each of soapberry, screwbean, mesquite, and desert willow. One species of each of the following genera occasionally reach the size of trees in southern Arizona, viz: Vanguelinia, Canotia, Bermulia, Koeberlinia, and Cowania. Among these may be mentioned the Douglas fir (*Pseudotsuga douglasii*), commonly known as Arizona pine, which reaches its southern extension on the high peaks of the Arizona mountains. Growing with the Douglas fir we find the western spruce (*Picea engelmanni*), the white pine (*Pinus flexilus macrocarpa*), and the close-grained foxtail pine (*Pinus aristata*). The latter species has very close-grained compact wood and little resin. In mining operations it is valuable for timbering purposes, but in Arizona its inaccessibility has rendered it of very little importance as yet.

About 9,500 feet, where the forests have been cut away or swept by fires, the aspen (*Populus tremuloides*) comes in and reforests the denuded districts. Large tracts in the San Francisco Mountain region, that in past years have been swept by fires, are now thickly covered with a growth of aspen.

At the lower border of the zone of yellow pine, pin oak (*Quercus gambellii*), cedar (*Juniperus occidentalis monospernia*), and juniper (*Juniperus pachiphloea*) begin to appear, and as we pass below the belt of yellow pine its place is taken by a scattered growth of nut pine, represented in Arizona by three species (*Pinus edulis, Pinus monophylla*, and *Pinus cembroides*), worthless for purposes of manufacture into lumber. These small pines are characteristic of the low mountains and foothills of Arizona, and one or more species are found in nearly all the mountains of the Territory.

Large areas of the Colorado plateau, below the pine zone, are covered with a scattered growth of juniper. Mingled with the pines and firs on some of the higher mountains are a number of deciduous trees, including a maple (*Acer grandidentatum*) and a locust (*Robinia new Mexicana*), while below the pines, at an elevation of from 6,000 feet to as many hundred, are more than 40 deciduous and evergreen species which may properly be termed trees, but nowhere, with the exception of mesquite, growing in sufficient proximity to be termed forests. Nearly all, however, are valuable for fuel and other domestic purposes.

The forests of southern Arizona are confined to the high mountains and to the banks of the water courses, and disappear entirely from the valleys and low mountain ranges which constitute all of the southwestern portion of the Territory. The most important and widely distributed species, peculiar to the water courses of southern Arizona, is the mesquite (*Prosopis julipora*). The foothills are covered with a scattered growth of palo verde (*Parkinsonia microphylla* and *Parkinsonia torreyano*), mountain mahogany (*Cercocarpus paroifolius* and *Cecocarpus ledifolius*), giant cactus (*Cactus gigantus*), and a number of less conspicuous species. The canyons are lined with cottonwood (*Populus fremonti*), alder (*Alnus oblongifolia*), ash (*Fraxinus velutina*), willow (*Salix nigoa* and *Salix taxifolia*), walnut (*Juglans respestris*), and black oak (*Quercus emongi*).

A number of rare and local trees are found in portions of the Territory. The Arizona cypress (*Cupressus arizonicus*) is a conspicuous tree in a number of the high mountain canyons of the south and central regions. An ironwood (*Ostiga knowltonii*) is restricted to the Grand Canyon of the Colorado, while an oak (*Quercus toumeyi*) is only found on the Mule Mountains.

NATURAL SCENERY.

Arizona has more magnificent and diversified natural scenery than any other locality in the known world. The Grand Canyon of the Colorado in northern Arizona is indescribable. According to Dutton, "it is a superlative manifestation of natural scenery. No imagination can construct out of its own material any intelligent conception of its awful immensity and splendid beauty. Distinguished savants and celebrated travelers do not hesitate for a moment to pronounce it by far the most sublime of all earthly spectacles. Its colossal buttes, its wealth of ornamentation, the splendor of its colors, and its wonderful atmosphere all combine with infinite perplexity to produce a scene which at first bewilders and then overpowers. As the mind strives to realize its proportions its spirit is broken and its imagination completely crushed." Science can not grasp its meaning, nor can the genius of poesy and art describe this masterpiece of omnipotent creation.

The way to the canyon is through magnificent forests and beautiful parks of fragrant pines, by picturesque hills and valleys and lofty snow-capped mountains. The trip can be comfortably made in a day from either Flagstaff, Williams, or Ash Fork, on the line of the Santa Fe Pacific Railroad, and all along the route is a continually changing panorama of scenic grandeur.

Notwithstanding the accessibility of this grandest of earth's natural wonders comparatively few Americans have been there, and it is stated that more people come from Europe every year to see the canyon than visit it from the United States.

Arizona has great ranges of majestic mountains, towering peaks with summits of snow, bordered by great plains and beautiful valleys; immense forests of pine and oak of unequaled area in the United States; marvelous canyons with cataracts and waterfalls of indescribable beauty; a forest of petrified or agatized wood unlike anything else in the world; a natural bridge, compared with which the Natural Bridge of Virginia fades into insignificance; great springs of mineralized water, hot and cold, and unexplored caverns in the earth of unknown extent.

HOT SPRINGS.

Arizona is especially favored with thermal springs possessing curative qualities of great value. The waters are very beneficial in curing rheumatism and nervous ailments, and for stomach and kidney troubles as well as skin and blood diseases. The water from some of the springs, either charged or still, are unexcelled for table use. The Castle Creek Springs, in Yavapai County, are situated among picturesque mountains, and have become popular as a place of resort for pleasure as well as health seekers.

There are many hot springs in the world, but in no other clime is there an open-air pool, fed by unfailing streams of hot medicinal water, where one may bathe at any hour of any day in the year without fear of taking cold.

This pool, fashioned by nature in the midst of towering peaks, has almost perpendicular walls on three sides and the blue Arizona sky for a covering. It is large enough for a comfortable swim. Into it pour unceasing streams of water at a uniform temperature of 114°. So dry and pure is the climate that one may enter this pool at any hour of the day, winter or summer, with absolute safety. These springs have modern hotel accommodations.

COLORADO RIVER, GRAND CANYON.

and a semitropic climate that is fast becoming famous the world over. I have heretofore attempted to describe it in the following language:

"This part of Arizona is divided into high mountain ranges, varying from 2,000 to 6,000 feet in elevation, gradually degenerating into foothills, valleys, and tablelands, usually called mesas. The valleys and mesas vary in elevation above sea level from 109 feet at Yuma to 1,100 feet at Phœnix and 2,400 feet at Tucson. In the valleys, lower mesas, and foothills we find the mild, salubrious climate that is fast making the Salt River Valley famous as the world's greatest sanitarium. This is more or less true of all the southwestern quarter of Arizona. Southern Arizona has been compared to Persia. If southern California is our Italy, southern Arizona is our Persia—in soil, in climate, in productions, and in the character of its landscape. It is much more like Persia than it is like any other locality in the United States, and in the next ten years it may well show the world what Persia might have been about the dawn of the twentieth century if it had fallen into the hands of the Anglo-Saxon. The date and lemon, the fig and pomegranate flourish in this region perfectly ripened every year, and undoubtedly the lemon reaches greater perfection in the Salt River Valley than in any other place in the United States if not in the world.

"It is in the Salt River Valley, with Phœnix as its center, where these unique climatic conditions exist in greatest perfection, although at Tucson and other localities in Pima County the climate is very similar, with a lower average temperature in the summer. Phœnix is the center of population and of cultivation of the soil, both agriculturally and horticulturally. Here human health and bountiful fruit production go hand in hand. The same causes that produce the one are always thriving under nature's programme to promote the other."

The details of climatic phenomena will appear from the following table of the Weather Bureau's climatological data for Phœnix, Ariz., for the year 1898:

Months.	Temperature.															
	Mean.				Extreme.		Mean.				Mean.					
	Dry bulb.		Wet bulb									Above.				
	8 a.m.	8 p.m.	8 a.m.	8 p.m.	Highest.	Lowest.	Maximum.	Minimum.	Monthly.	Normal.	Below 32.	41	50	59	68	77	90
January	40	54	35	44	73	23	58	36	47	49	0	23	10	3	0	0	0
February	47	70	40	52	81	36	74	44	59	54	0	28	28	13	0	0	0
March	46	68	38	49	83	33	71	43	57	61	0	31	27	10	0	0	0
April	59	83	48	58	102	41	87	57	72	67	0	30	30	28	19	7	0
May	60	86	48	58	99	48	88	59	73	75	0	31	31	31	24	8	0
June	70	98	55	66	110	57	100	69	85	83	0	30	30	30	30	29	8
July	81	102	68	72	111	73	104	80	92	90	0	31	31	31	31	31	18
August	80	98	68	72	109	71	101	78	90	88	0	31	31	31	31	31	15
September	70	96	58	66	106	64	99	69	84	81	0	30	30	30	30	30	0
October	57	83	43	57	99	47	89	54	72	69	0	31	31	31	24	3	0
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SPECIES OF INDIGENOUS TREES.

Arizona has about seventy-five species of indigenous trees, a number excelled by but few States in the Union. Of this number about half are evergreen, including a large number of species of pine and oak.

We have nine species of oak, ranging in size from a mere shrub to the black oak, which sometimes reaches a diameter of more than 4 feet. On our mountains and high plateaus are found eleven pines, from our large yellow pine to the small nut pine of our southern mountains. Four willows grow along our water courses, and two cottonwoods and an aspen find a home at varying altitudes. Four junipers cover large areas between 4,000 and 6,000 feet, or occur as isolated specimens on the foothills and lower mountains. A spruce, two firs, a balsam, and a cypress mingle with the higher pines, and farther down are found two maples, three ashes, three species of mountain mahogany, two ironwoods, and species each of madrona, juneberry, buckthorn, redbud mulberry, cherry, walnut, sycamore, alder, locust, and hackberry.

The following are more southern species, which extend along the water courses, or are found on the foothills of southern Arizona, viz: Three paloverdes, three arborescent cacti, and one species each of soapberry, screwbean, mesquite, and desert willow. One species of each of the following genera occasionally reach the size of trees in southern Arizona, viz: Vanguelinia, Canotia, Bermulia, Koeberlinia, and Cowania. Among these may be mentioned the Douglas fir (*Pseudotsuga douglasii*), commonly known as Arizona pine, which reaches its southern extension on the high peaks of the Arizona mountains. Growing with the Douglas fir we find the western spruce (*Picea engelmanni*), the white pine (*Pinus flexilus macrocarpa*), and the close-grained foxtail pine (*Pinus aristata*). The latter species has very close-grained compact wood and little resin. In mining operations it is valuable for timbering purposes, but in Arizona its inaccessibility has rendered it of very little importance as yet.

About 9,500 feet, where the forests have been cut away or swept by fires, the aspen (*Populus tremuloides*) comes in and reforests the denuded districts. Large tracts in the San Francisco Mountain region, that in past years have been swept by fires, are now thickly covered with a growth of aspen.

At the lower border of the zone of yellow pine, pin oak (*Quercus gambellii*), cedar (*Juniperus occidentalis monospernia*), and juniper (*Juniperus pachiphloea*) begin to appear, and as we pass below the belt of yellow pine its place is taken by a scattered growth of nut pine, represented in Arizona by three species (*Pinus edulis, Pinus monophylla*, and *Pinus cembroides*), worthless for purposes of manufacture into lumber. These small pines are characteristic of the low mountains and foothills of Arizona, and one or more species are found in nearly all the mountains of the Territory.

Large areas of the Colorado plateau, below the pine zone, are covered with a scattered growth of juniper. Mingled with the pines and firs on some of the higher mountains are a number of deciduous trees, including a maple (*Acer grandidentatum*) and a locust (*Robinia new Mexicana*), while below the pines, at an elevation of from 6,000 feet to as many hundred, are more than 40 deciduous and evergreen species which may properly be termed trees, but nowhere, with the exception of mesquite, growing in sufficient proximity to be termed forests. Nearly all, however, are valuable for fuel and other domestic purposes.

The forests of southern Arizona are confined to the high mountains and to the banks of the water courses, and disappear entirely from the valleys and low mountain ranges which constitute all of the southwestern portion of the Territory. The most important and widely distributed species, peculiar to the water courses of southern Arizona, is the mesquite (*Prosopis julipora*). The foothills are covered with a scattered growth of palo verde (*Parkinsonia microphylla* and *Parkinsonia torreyano*), mountain mahogany (*Cercocarpus paroifolius* and *Cecocarpus ledifolius*), giant cactus (*Cactus gigantus*), and a number of less conspicuous species. The canyons are lined with cottonwood (*Populus fremonti*), alder (*Alnus oblongifolia*), ash (*Fraxinus velutina*), willow (*Salix nigoa* and *Salix taxifolia*), walnut (*Juglans respestris*), and black oak (*Quercus emongi*).

A number of rare and local trees are found in portions of the Territory. The Arizona cypress (*Cupressus arizonicus*) is a conspicuous tree in a number of the high mountain canyons of the south and central regions. An ironwood (*Ostiga knowltonii*) is restricted to the Grand Canyon of the Colorado, while an oak (*Quercus touneyi*) is only found on the Mule Mountains.

NATURAL SCENERY.

Arizona has more magnificent and diversified natural scenery than any other locality in the known world. The Grand Canyon of the Colorado in northern Arizona is indescribable. According to Dutton, "it is a superlative manifestation of natural scenery. No imagination can construct out of its own material any intelligent conception of its awful immensity and splendid beauty. Distinguished savants and celebrated travelers do not hesitate for a moment to pronounce it by far the most sublime of all earthly spectacles. Its colossal buttes, its wealth of ornamentation, the splendor of its colors, and its wonderful atmosphere all combine with infinite perplexity to produce a scene which at first bewilders and then overpowers. As the mind strives to realize its proportions its spirit is broken and its imagination completely crushed." Science can not grasp its meaning, nor can the genius of poesy and art describe this masterpiece of omnipotent creation.

The way to the canyon is through magnificent forests and beautiful parks of fragrant pines, by picturesque hills and valleys and lofty snow-capped mountains. The trip can be comfortably made in a day from either Flagstaff, Williams, or Ash Fork, on the line of the Santa Fe Pacific Railroad, and all along the route is a continually changing panorama of scenic grandeur.

Notwithstanding the accessibility of this grandest of earth's natural wonders comparatively few Americans have been there, and it is stated that more people come from Europe every year to see the canyon than visit it from the United States.

Arizona has great ranges of majestic mountains, towering peaks with summits of snow, bordered by great plains and beautiful valleys; immense forests of pine and oak of unequaled area in the United States; marvelous canyons with cataracts and waterfalls of indescribable beauty; a forest of petrified or agatized wood unlike anything else in the world; a natural bridge, compared with which the Natural Bridge of Virginia fades into insignificance; great springs of mineralized water, hot and cold, and unexplored caverns in the earth of unknown extent.

HOT SPRINGS.

Arizona is especially favored with thermal springs possessing curative qualities of great value. The waters are very beneficial in curing rheumatism and nervous ailments, and for stomach and kidney troubles as well as skin and blood diseases. The water from some of the springs, either charged or still, are unexcelled for table use. The Castle Creek Springs, in Yavapai County, are situated among picturesque mountains, and have become popular as a place of resort for pleasure as well as health seekers.

There are many hot springs in the world, but in no other clime is there an open-air pool, fed by unfailing streams of hot medicinal water, where one may bathe at any hour of any day in the year without fear of taking cold.

This pool, fashioned by nature in the midst of towering peaks, has almost perpendicular walls on three sides and the blue Arizona sky for a covering. It is large enough for a comfortable swim. Into it pour unceasing streams of water at a uniform temperature of 114°. So dry and pure is the climate that one may enter this pool at any hour of the day, winter or summer, with absolute safety. These springs have modern hotel accommodations.

COLORADO RIVER, GRAND CANYON.

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OLDEST PALM IN PHŒNIX.

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DATE PALM, OLIVE, AND FIG TREE, SALT RIVER VALLEY.

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south, east, and west, and so located that it is the only garrison between the line of posts on the eastern border of the Territory and the Pacific coast, Whipple Barracks should be maintained as one of the important military posts of the West. It is especially well situated to control local disturbances, should any occur, being near the center of population in the Territory and within easy reach of the great mining camps and railroad lines, where large forces of men are employed, and its restoration and retention will insure security to life and property and establish confidence that law and order will at all times be upheld.

The post can be maintained with exceptional economy on account of cheap supplies obtainable from the Salt River Valley. New waterworks and a system of sewerage are being constructed by the city of Prescott, which can be made available by the post. The sanitary advantages of this location can not be excelled in the country.

I earnestly concur in the recommendation heretofore made by Gen. E. S. Otis that at least three companies should be the minimum garrison as soon as the existing exigencies of the situation abroad will permit.

THE NATIONAL GUARD.

I regret to report that no appropriation for the maintenance of the National Guard during the current biennial period was made by the legislative assembly at its last session; but notwithstanding this discouragement, it is gratifying to announce that the organization and discipline of the guard have not suffered and that popular pride and interest therein have not been diminished.

The war with Spain and the military operations in the Philippines have brought out numerous evidences of the patriotism of the citizens of Arizona. The long roll of enlistments and the many other proofs of loyalty to the policy of the National Administration abundantly prove that our people are lacking neither in military spirit nor in steadfast patriotism, and the enthusiastic maintenance of the National Guard despite the oversight of the legislative branch is not the least of these manifestations.

During the past year no event has called for the services of the guard. During July and August there has been some disquietude along the southern border of the Territory, due to apprehension that the outbreak of Yaqui Indians in the State of Sonora, Mexico, might result in raids on Nogales and other settlements on the international boundary line, and it was feared in that locality that the services of the guard might be required to repel attacks from renegade Yaquis, but such fears proved to be groundless. As the best and most economical means of assuring security to our citizens on the border, I suggested to the Secretary of War that a company of United States troops at Fort Huachuca, which is but a short distance from Nogales, should be held in readiness, and, if deemed best, stationed at Nogales during the outbreak. The honorable Secretary replied that the War Department would take precautions to protect American citizens from incursions across the line, and so far there has been no occasion for further action.

Following are extracts from the report of the adjutant-general:

The National Guard of Arizona consists of 1 regiment of infantry, composed of 10 companies, the regimental band, and the staff of the commander in chief. The aggregate strength of the guard is 505 officers and men. The officers and men of the National Guard of Arizona are imbued with praiseworthy enthusiasm in the work of promoting the efficiency of the guard, and have, by commendable pride, military bearing, and excellent discipline, justified the confidence of the people.

DATE PALM, OLIVE, AND FIG TREE, SALT RIVER VALLEY.

UNIV. OF MICH.

The military code provides that the National Guard of Arizona, when on duty, shall wear the uniform of and shall be equipped, drilled, and disciplined in the same manner as the Army of the United States.

To date the undress uniform is all that has been furnished them, and for service and utility it is all that can be desired. Under regulations from this office, officers except those of the general staff are permitted to wear the dress uniform for social occasions only.

The United States Government has, in the eight years since the National Guard was reorganized, issued for its use some $18,000 worth of arms and equipments (including $2,308.06 apportioned to Arizona for the fiscal year ending June 30, 1899). These supplies have been issued to the commanding officers of the various companies, who are under bonds to the Territory for their safe-keeping. With this amount of valuable property on hand to be cared for, the amount appropriated by the Territory for armory rental is absolutely necessary and essential for their preservation.

The Territory has made no appropriation whatever for supplies for the equipment of the National Guard.

As indicating the superior physique of our people, only 20 per cent of those who applied for enlistment in the volunteers from this Territory were rejected for all causes, notwithstanding that the most severe and rigid examination was made by the United States mustering officer, a percentage less than that in any other State or Territory, and which bespeaks the physical stamina and moral worth of our people, who gave to the nation a magnificent body of men. I am justified in saying that the National Guard of Arizona is composed of officers and men that have no superiors as soldiers.

The National Guard of Arizona has adopted the Army of the United States as its standard in military matters, and though embarrassed by lack of adequate appropriations, inefficient equipments, and unsuitable armories, yet there is evidenced everywhere by manifest proficiency that there is a determined purpose on the part of the organizations to reach a superior degree of excellence.

The National Guard of Arizona is not perfect, but it is in a highly creditable condition. It has healthy and strong military sentiment. Its officers are, as a rule, zealous, competent, and under discouraging circumstances have labored hard and laid a foundation on which in time there will be developed a very superior guard.

Statistics issued by the War Department show that the proportion of national guardsmen to the total population is greater in Arizona than in any other State or Territory. In the United States the proportion is 1½ per 1,000, while that of Arizona is about 5 guardsmen to 1,000 of population.

During the past year there has been organized by special detail a hospital corps, which has been placed under the command of the surgeon-general, and a signal section, placed under the command of First Lieut. O. A. Turney, who has been especially detailed as signal officer.

Present strength of the National Guard of Arizona.

Governor's staff:	
Brigadier-general	1
Colonels	3
Lieutenant-colonels	4
Majors	2
Chaplain	1
First lieutenant	1
	12
First Regiment Infantry:	
Colonel	1
Lieutenant-colonel	1
Majors	3
Surgeon	1
Assistant surgeons	2
Adjutants	2
Quartermaster	1
Commissary of subsistence	1
Chaplain	1
Captains	10
First lieutenants	10
Second lieutenants	10
Total commissioned	43
Noncommissioned officers	74
Musicians	41
Privates	335
Total enrolled	450
Aggregate First Infantry	493
Aggregate National Guard of Arizona	505

UNDEVELOPED RESOURCES.

The undeveloped resources of Arizona in precious metals, agriculture, horticulture, grazing and timber, mineral springs, marble and building stone, onyx, coal, and nearly every natural product known to commerce, make the Territory one of the wealthiest subdivisions of the Union and insure its future as a great and prosperous State.

THE ARID LANDS AND WATER STORAGE.

The agricultural development of Arizona has been carried to a point beyond which much further progress in the line of enlarging the cultivated area can not be achieved without an increased water supply. The advantages offered by nature—a mild and almost superlatively healthful climate and a soil unexcelled in fertility and lying in level reaches in broad valleys unencumbered by wild vegetation and therefore ready for the plow, together with a ready market for all ranch and orchard products—have stimulated settlers in the work of reclaiming the desert, until the ultimate unit of the normal flow of the streams (except the Colorado River) has been diverted into irrigating canals. And in many cases the zeal of the pioneer has led him to construct ditches for the diversion of more water than the average flow of the stream justifies, thus bringing on a conflict with the prior appropriators over the ownership of the available supply. Yet the relation which the land so far reclaimed bears to the irrigable area is fractionally small. There are hundreds of thousands of acres of rich and level public land lying in the valleys of the Salt and Gila rivers which would be brought under irrigation from those streams were their flow adequately increased; and in other valleys of the Territory there are vast bodies of land which, if irrigated, would support a large population.

The further development of the water supply is, therefore, one of the most absorbing problems with which the people of this Territory have to deal. Confining the consideration of the question to the solution of the difficulties which confront only the people already here, it is extremely important. For, magnificent as is the showing made by the agriculturists and horticulturists and by the cities and towns of our prosperous valleys, the great wealth already created and the handsome profits yearly reaped are far short of what the land actually irrigated is capable of producing. Contending frequently with an insufficiency of water, the irrigators are often compelled to resort to a prorating of the diminished flow during the dry season and are forced to be content with a yield which, however profitable in itself, is short of the great capabilities of the soil.

It is conceded that Arizona has natural resources which would, if properly developed, make the Territory one of the most important agricultural States in the Union in point of population and productive power.

The question is also of great importance considered from the standpoint of national interest in respect to the use of the arable public domain. The eagerness with which settlers sought homes in Oklahoma when it was thrown open for settlement, crowding in until they

HEAD OF ARIZONA CANAL DAM, ON SALT RIVER.

UNIV. OF MICH.

had created a new commonwealth in a day, the quick occupancy of the various Indian reservations of the semihumid States as they were thrown open to settlement in recent years, and the thousands of homes carved out of the desert amid the most discouraging difficulties, furnish convincing proof of the importance of this subject to the economy of the nation.

From the beginning of our National Government no question has been more continuously interesting than that of the proper utilization of the public domain. Solved for a time by the homestead law, the question reappears and presses for consideration more urgently now than at any stage of our history. Its urgent consideration is necessary because we have reached a development where the homestead law no longer meets the requirements of the situation. The arid lands present new problems which must be solved. In the Eastern and Middle States the growth of population has wrought such changes in economic conditions that the competition in all lines of business was never so keen and the national tendency to "expand" and establish new communities never had greater reason for existence. But, having taken up practically all the public land whereon it is possible to farm without irrigating the soil, the tide of Western emigration encounters in the so-called arid region an insuperable barrier to the creation of farm homes under existing conditions.

The land still vacant and open to settlement within the boundaries of the United States (excluding Alaska) comprises an area of nearly 600,000,000 acres, or almost one-third of the total extent of the country. Most of this is included in what is known as the arid region. Much of it is wholly unfit for agriculture under any circumstances, and there is no reliable data as to the exact quantity of irrigable land for which it is possible to develop a constant water supply. But the best information already gathered by the Government warrants the assertion that in the arid States and Territories enough water can be stored to support on irrigated lands enough people in new agricultural communities to more than equal the present population. Leaving out of consideration the settlement of Oklahoma, which was almost immediate, statistics show that since 1890 the public lands have been disposed of at a rate of hardly more than 1 per cent per annum, and the fact illustrates the conditions which the Government must meet hereafter. Wise statesmanship urges the development of our national resources, and the bringing into use of all dormant assets. In no part of our country has permanent wealth been created more rapidly than in the sections which have been brought under irrigation. Under the system of farming naturally followed in the irrigated regions, of which Arizona is typical, small farms are found to be the rule. A few acres suffice for the comfortable maintenance of a family, and with irrigation all the conditions are conducive to a full settlement of the country. Therefore statistics as to the reclaimable area do not carry an adequate conception of the advantages to the home-seeking population of the country, following a large increase of the water supply.

The following table prepared by the Geological Survey (Public Lands and Their Water Supply, by F. H. Newell) in 1895 is an interesting presentation of the status of the public lands as it was at that

date, and there has been no material change since that time, save in the fuller data concerning the water supply:

Vacant lands in the Western public land States.

States and Territories.	Vacant.		Millions of acres.				
	Square miles.	Acres.	Grazing.	Wood.	Forest.	Desert.	Water supply.
Arizona	85,908	54,981,120	30	3	7	15	2
California	90,215	57,737,600	27	5	6	19	17
Colorado	66,994	42,837,760	30	7	6	.....	8
Idaho	75,009	48,003,360	19	20	8	.....	7
Montana	114,057	72,996,480	50	13	10	.....	11
Nebraska	17,186	10,999,040	11	.....	.....	.....	1.5
Nevada	104,571	66,925,440	42	5	.....	20	2
New Mexico	85,202	54,953,280	45	8	2	.....	4
North Dakota	33,090	21,177,600	21	.....	.....	.....	0.5
Oklahoma	15,213	99,736,320	9	.....	.....	.....	1
Oregon	55,887	35,767,680	17	11	9	.....	3
South Dakota	25,204	16,130,560	15	.....	1	.....	1
Utah	67,906	43,077,120	16	11	6	10	4
Washington	32,757	20,964,480	6	5	10	.....	3
Wyoming	83,644	53,532,160	36	8	5	5	9
Total	952,375	609,520,000	374	96	70	69	74

TOPOGRAPHICAL FEATURES OF ARIZONA.[1]

The Territory of Arizona covers approximately 113,000 square miles, of which about 39,000 lie below the altitude of 3,000 feet, about 27,000 lie between the contours of 3,000 and 5 000 feet, and about 47,000 lie above the elevation of 5,000 feet. The highest point in the Territory is San Francisco Mountain, in the northern part, which reaches an altitude of nearly 13.000 feet. The Territory is sharply divided into two characteristic portions by the trend across it of the main axis of the great Colorado Plateau, from the northwestern corner of the Territory, in a nearly southeasterly direction. The plateau slopes gently to the northward, but on the southwestern side breaks off suddenly throughout most of its course, and its steep slope is deeply carved by lines of erosion. Almost the whole of that portion of the Territory which is below an elevation of 3,000 feet lies to the southward of this escarpment.

To the north of the escarpment the temperature ranges from that of the temperate zone to that where snow is nearly perpetual, on the summits of the San Francisco and White Mountains. The southern portion of the Territory is characterized by temperatures which may be designated as ranging from temperate, along the foothills of the Colorado Plateau, to semitropic, in the lower valley of the Gila and Colorado. The southern portion of the Territory may be again subdivided into two portions, that draining directly into the Colorado and lying to the westward of Prescott, and the greater portion to the south and east, which forms the great Gila River system. The Colorado Plateau is partly of igneous origin, and a great portion of it is somewhat pervious to water. Its northern slope for a considerable distance from the summits is very gentle, and though the precipitation is greater than in most portions of the Territory, it is very meagerly marked by drainage lines and almost destitute of water. Sharply contrasted with these facts are the conditions on the southern slope. Here, through most of its course, the plateau drops off with a very deep slope, which is deeply cut with drainage lines, in which are living creeks and rivulets of clear, beautiful water, such as San Francisco River, Black Creek, Bonito Creek, White River, Carizo Creek, Wild Rye Creek, East Verde River, Cibicu Creek, Box Creek, Cherry Creek, Tonto Creek, Pine Creek, Fossil Creek, Clear Creek, Beaver Creek, etc.

The region of high altitude, as before remarked, lies largely north of the divide, while the great bulk of the water flowing from the plateau, as proved both by erosion and drainage lines and by the volume of permanent streams, flows away to the south. The explanation of this is partly the porosity of the strata composing the plateau, which allows the water to sink instead of flowing off the surface. Once underground its egress to the south is favored by the shorter distance which it must percolate on a given grade before reaching the surface, due to the more abrupt slope,

[1] "Water Supply and Irrigation Papers," No. 2, Geological Survey.

Another partial explanation is found in the meteorological condition. The moisture of this region is brought from the Pacific Ocean and the Gulf of California by the prevailing southwest wind. As this wind ascends the elevations toward the Colorada Plateau its temperature is lowered, which reduces its capacity for holding moisture and increases its relative humidity. When this quantity reaches 100 per cent in any part precipitation occurs. This influence continues until the wind passes the summit, where the process is reversed.

As might be expected, therefore, the hydrographic resources of the country immediately southwest of the Colorado Plateau are disproportionately great when compared with those to the northward. For instance, the precipitation at Fort Apache, as shown by the mean of twenty years' observations, is 19.75 inches; the elevation being 5,050 feet, while the precipitation at Holbrook, at an elevation of 5,047 feet on the northern slope is 8.47 inches, as indicated by the mean of ten years' observations. This is an important fact, especially when taken in connection with the fact that the great areas of valley land with a semitropic climate lie in the southwestern portion of the Territory, and are easily covered by the streams which are formed by the conditions above described, and which constitute the main features of the great Gila River system.

The drainage area of Gila River, including a number of small lost basins which are topographically tributary, but which seldom or never furnish any run-off to the main stream, is about 72,000 square miles, of which nearly 57,000 lie in the Territory of Arizona, about 14,000 in New Mexico, and something over 1,000 in Mexico. The areas in the United States are distributed, with respect to elevation, approximately as follows:

Elevation.	Area of basin.	Area.
	Per cent.	*Sq. miles.*
Under 1,000 feet	9	6,400
Between 1,000 and 2,000 feet	19	13,500
Between 2,000 and 3,000 feet	16	11,400
Between 3,000 and 4,000 feet	14	10,000
Between 4,000 and 5,000 feet	15	10,700
Between 5,000 and 6,000 feet	12	8,500
Between 6,000 and 7,000 feet	8	5,600
Over 7,000 feet	7	4,900
Total	100	71,000

Gila Basin is conveniently divided into four parts. Of these, the most northerly is Salt River Basin, which includes all the territory tributary to Salt River. This again is sharply divided into its valley and mountain portions. Salt River Valley may be taken as including all the territory adjacent to Salt River from its mouth up to the junction of the Rio Verde. Above that point the greater portion of the basin is mountainous, with small valleys on the Rio Verde and in Tonto Basin, and at a few points on Salt River and other tributaries. The Lower Gila district may be taken as the portion lying below the mouth of Salt River to the Buttes above Florence, and including the Pima (Gila River) Reservation and the great Casa Grande Valley. The Upper Gila district includes the valley in the region of Camp Thomas and Solomonville and the tributary mountainous districts. In addition to these main divisions of the trunk streams may be taken the subordinate divisions of tributaries, such as San Pedro, Santa Cruz, Hassayampa, and Agua Fria creeks.

The tables of temperature for the Gila and Salt River valleys show that the climate is very warm. But care should be taken not to exaggerate this feature, for the actual conditions in their relation to human life and comfort are by no means as unfavorable as they might appear to persons comparing these tables of temperature with those of some eastern localities. For about eight months in the year the temperature of this valley is delightful. Cool nights, bracing mornings, and bright, pleasant days are the rule, except in the months of June, July, August, and September. In these months the heat becomes intense, and though there is of course some variation, the temperature remains continually high throughout the greater part of this period.

The physiological effect of this heat is markedly modified by the aridity of the climate. The human economy provides that when the temperature of the healthy body rises above the normal the perspiration glands begin to act and furnish the skin with moisture, the evaporation of which lowers the temperature of the body.

An essential condition of this natural safeguard against excessive heat depends upon the ready evaporation of the moisture furnished by nature. In a very

humid climate this evaporation can not occur; and in those portions of the country where the humidity is comparatively high such evaporation must be proportionately tardy and sluggish, so that any considerable temperature above normal blood heat produces great suffering and exhaustion, and even prostration. In an arid region on the contrary, the low percentage of humidity causes prompt and quick evaporation of the moisture and the consequent success of nature in its attempt to prevent uncomfortable and injurious bodily temperature.

In southern Arizona these favorable conditions for resistance to heat are at their maximum. Though the temperature is high, the relative humidity is very low, and every particle of moisture which reaches the surface of the skin is promptly evaporated—so promptly that its presence is not perceived—and while the body is thus kept at its normal temperature the unpleasant effects of excessive moisture are not experienced; and the sultry, sticky days so common in the east are unknown in Arizona. Farm labor, the construction of canals, the rounding up and branding of cattle, and other active hard labor are performed at any time in the summer—with less comfort of course—but with no worse effects, than at at any other time of the year, and without actual suffering, the only requisite being plenty of drinking water.

A fair comparison of the sensible temperatures of two places may be obtained by a comparison of the readings of wet bulb thermometers. The difference between the readings of wet and dry bulb thermometers here often exceeds 30°.

The summer is, therefore, far from being as uncomfortable as might be supposed, and the delightful autumn, winter, and spring fully compensate for the discomforts of the summer months; and the climate, taken as a whole, with its extreme aridity, its mildness, and its large proportion of sunshine, is exceptionally healthy and especially beneficial to those suffering from bronchial or pulmonary troubles.

RAINFALL AND FLOODS.

Water being one of the most valuable of Arizona's resources, its proper conservation and economical use are of prime importance. There are periods of the winter season when but comparatively little irrigation is necessary, during which the greater part of the entire flow of the streams could, with reservoirs, be held back and stored for use in the spring and summer, thus greatly enhancing its value for the crops during their season of most rapid growth. Reservoirs, therefore, would be very useful even were there no floods to be considered. A storage system would put an end to the lavish use of water in winter, a practice to which irrigators now resort because the water is at hand and going to waste.

But it is in the extent to which the floods can be utilized in the reclamation of the vacant lands that public interest chiefly centers. Much of the rainfall is so torrential in character that a high percentage of the run-off is carried by the streams in flood. Sudden floods are caused also by warm winds and rains attacking the snow in the mountains in the latter end of winter. From long observations of these floods the older residents of the Territory are convinced that the land already under irrigation is but a tithe of that which could be reclaimed were the water stored which runs to waste to the sea. No one doubts that the area reclaimable under the water supply available for storage is many times greater than the area already irrigated. These general statements must suffice, because of the absence of exact data as to the quantity of rainfall and the average yearly volume of water carried in flood. In no other section of the country, probably, are the streams so capricious and fluctuating in volume. Storms of a cloudburst nature in the mountains often add in a few hours many thousands of cubic feet to the flow of the rivers.

The difficulty of making accurate measurements under such conditions is obvious. Records of the rainfall are not as complete as is desirable, but the measurements taken through a long series of years

and at points fairly representative of the whole Territory yield data from which very close calculations can be made as to the annual precipitation.

Observations were begun at Forts Whipple, McDowell, and Bowie as early as 1866–67 and carried forward to a recent period. Other stations were established later, so that for the last twenty years the records of a score of stations are obtainable. It is thus demonstrated that while the mean precipitation in the lower valleys is very slight—ranging from 3.16 inches at Yuma and 5.34 inches at Casa Grande to 7.60 inches at Phœnix—in the drainage acres proper—i. e., in the region of great run-off—it is much heavier. For illustration, Fort Apache shows a mean precipitation of 19.75 inches; Fort Whipple, 16.06 inches; Fort Verde, 13.24 inches; Fort Grant, 15.45 inches; San Carlos, 13.03 inches; Pinal Ranch, 20.46 inches. But the sections of the drainage area from which the least official information has been gathered are the sections over which the greatest precipitation occurs, as they are the sections of highest altitude, least accessibility, and of sparse settlement, and the observatory stations have been usually located at military posts or in the towns of the lower altitude.

When consideration is given to the wide extent of the drainage areas tributary to the irrigable valleys; to the precipitous, rocky, and barren condition of the mountains, so conducive to a maximum of run-off with a minimum loss from seepage, and to the character of the rainfall, the conclusion is inevitable that in Arizona the water supply can be increased enormously if the larger portion of the floods is stored. And if the Geological Survey's eminently conservative estimate of 2,000,000 acres be accepted as the maximum quantity of land in this Territory for which sufficient water can be developed, I regard it as well within the probabilities to estimate that that amount of land will, when properly irrigated, directly support 1,000,000 people.

In order that there may be an intelligent understanding of the question, in so far as it affects Arizona, it is necessary to review, in some detail, the situation of the irrigation industry as we find it to-day.

It is less than twenty years since the large investment of capital in irrigation enterprises in the West was begun, and hundreds of millions of wealth have been created by the new industry. Individuals and corporations have constructed in the agricultural sections ditches carrying all the normal flow of the streams, and a number of costly reservoirs have been constructed in different parts of the arid West, which impound a great additional quantity of flood waters. Influenced by the phenomenal development of the country under irrigation and by the profits derived from less costly irrigation enterprises, capital was led by too sanguine promoters to investment on a larger scale, which, for years, proved disastrous in many cases. The business of impounding water was new, and it was but natural that many mistakes were made. In some instances due investigation had not been made as to the average run-off of the streams. Incorrect deductions were made from exceptional floods, and after costly dams were constructed it was found that the drainage area and rainfall had not been accurately calculated, and in some years the reservoirs were practically dry. But more frequently, oversanguine calculations had been made as to the beginning of revenue.

Investors found that they had not taken sufficient account of the time which must elapse before these lands could be settled and cultivated sufficiently to be made productive of revenue.

Often there was litigation over the ownership of the water which prevented the revenues earned from reaching the pockets of security holders, and lands owned by the water companies were held at an exorbitant market price. Meanwhile, interest charges accumulated and stockholders and bondholders became discouraged. These things, added to extravagant and unnecessary cost of construction, overcapitalization, etc., served to give irrigation investments a bad reputation. Yet the fact remains that the storage enterprises which were carried to completion are at last, under intelligent and economic management, beginning to pay. With the experience gained from the past, and in possession of the extremely valuable data gathered in the past few years by the industrious engineers of the Geological Survey; with reliable information at hand as to the capacity of reservoir sites, the drainage area tributary to them, and the average precipitation which may be expected; with the cheapened cost of constructing dams and the knowledge which engineers have gained as to the proper mode of construction, the builders of storage dams, operating on conservative and business-like lines, hereafter should not fail to make any ordinary storage enterprise a profitable one for investors as well as for the country which they supply.

SOME RESERVOIR SITES AND STORAGE PROJECTS.

There are numerous reservoir sites in the Territory. On all the interior streams carrying volumes of consequence nature has provided storage sites, and reference will be made only to those of largest capacity.

Perhaps the most attention has been paid to the sites on the Gila by the engineers of the Government, because of the pressing necessity of providing the Gila River Indian Reservation with water for irrigation. The 4,000 Indians on that reservation were formerly self-supporting, but the waters of the Gila having been diverted by the farmers in Pinal and Graham counties, the occupants of the reservation are no longer able to raise crops sufficient for their sustenance, and under existing conditions they are certain to become absolute wards of the Government at a heavy expense each year for their maintenance. The fact that they are peaceable and fairly industrious long since bespoke for them a careful consideration of the problem of supplying them with water through some system of storage.

Investigations made by the hydrographers of the Geological Survey have yielded valuable data concerning the most prominent sites on the Gila. At The Buttes, 14 miles above Florence, the first reconnaissance was made some four years ago, and since then measurements of the flow of the river have supplemented the information gained in the first investigation. Last winter Congress made an additional appropriation for the purpose of ascertaining the location of bed rock at the dam sites theretofore examined, and during the present year much additional information has been gathered.

It is now definitely known that at The Buttes a dam 150 feet high will store enough water to cover 174,000 acres to a depth of 1 foot, or as it is technically stated, will impound 174,000 acre-feet. The dam would be 300 feet long at the bed of the stream, and 800 feet at the top. The original round-figure estimate of cost was $2,000,000, but that estimate was based on the belief that bed rock is nearer the surface than this year's investigations have shown it to be. But within a recent period the cost of handling rock has been cheapened by

IRRIGATING FRUIT TREES.

improvements in methods resulting from the experience gained in the construction of the Chicago Drainage Canal and other works of recent date, and as it is known that the estimate of $2,000,000 was a liberal one, it is thought that the cost of building The Buttes dam will not exceed that estimate, notwithstanding the disappointing distance to bed rock.

At Riverside there is another valuable site for a reservoir dam, and at that point a dam 350 feet long at the base and 800 feet at the crest would create a reservoir still greater than the one proposed for The Buttes. At Riverside the bed rock has been found much nearer the surface than at The Buttes, but at this writing the estimate of construction cost has not been made public.

At San Carlos, on the Apache Reservation, there is another site, to which much attention has been directed during this year's series of investigations. The conditions there are exceptionally favorable for economical construction. The river passes through a narrow gorge, and a dam 150 feet high would be but 200 feet long at the crest, and would create a reservoir of 361,000 acre-feet capacity.

Each of the reservoir sites above referred to is still within the control of the Government, and the building of a dam at either point would furnish not only an abundant supply of water for the Indians on the Gila River Reservation, but would afford a splendid surplus for the settlers of the middle Gila Valley. The actual importance of the storage capacity of the sites mentioned is better understood if considered in connection with the "duty of water."

The duty of water, or the quantity of water necessary to adequate irrigation of an acre of ground in the Gila, Salt River, and other valleys of this Territory, has not been fixed with the definiteness which has been ascertained in other irrigated communities of the West where the flow in the canals is closely regulated and therefore freer from complications in calculation. And while there are substantial differences of opinion, due to the variable and capricious supply, and the custom already alluded to, of lavish and wasteful use of the water in seasons of plenty, it appears to be fairly settled that the actual requirements of an acre of ground cultivated to growing crops throughout the year and irrigated at regular periods—as in the case of alfalfa, for instance—can not be filled with less than 2 acre-feet. But by no means is all the ground cultivated during the year. After producing its particular crop a tract may lie fallow for months. Also, a good percentage of the acreage is taken up by roads, buildings, and corrals, and bearing in mind that usually only the flood waters would be impounded, supplemental to which would be the normal flow, it would seem safe to accept the prevalent conclusion that the storage capacity of a reservoir will represent, acre for acre, its irrigating capacity.

The Gila River Reservation embraces 357,120 acres and at least 200,000 acres can be covered by irrigating canals. Under a storage system this reservation could be made to support all the civilized Indians in the territory, and still afford a large surplus of land for white settlers. It being an Executive order reservation, the land controlled by the Indians could be curtailed to the area actually required for their support, and the remainder thrown open to public settlement, simply by the order of the President.

It would seem that here is an exceptional situation which warrants Congress in making the necessary appropriation for the construction of a reservoir, quite independently of the broad question as to the advisability of the Government adopting a general policy of reservoir

construction. The wisdom of enabling the Indians to become self-supporting is universally admitted. When, as in this case, that policy can be carried out on lines financially profitable as well, there can be no objection urged on any valid ground. Not only would the Indians gladly pay for water, but the farmers in the valley between any reservoir and the reservation would be good customers for any surplus. It is entirely safe to predict that the irrigators would readily pay $2 per acre per annum for stored water. Prominent and responsible ranchmen in the Salt River Valley have said that they would cheerfully pay $3 per acre per year for a properly regulated and adequate supply, such as would be furnished by a reservoir.

On the Upper Gila, at the extreme eastern side of the Territory, there are one or more reservoir sites which could be utilized for a storage supply to the already prosperous farming regions of Graham County.

On the Lower Gila, as the valley below the junction of the Salt and Gila rivers is called, there are also sites where the construction of substantial dams would impound large quantities of water.

Another important site which has received much attention from the engineers of the Government is that on Queen Creek, in Pinal County, some 40 miles east of Phœnix. From a reservoir at this point some water could undoubtedly be furnished to the Gila River Reservation. It was estimated by the hydrographer who made the original reconnoissance (Mr. Arthur P. Davis) that a supply of about 10,000 acre-feet per annum could be depended upon from this project at a construction cost of $200,000.

Storage is likewise feasible in the Santa Cruz Valley, Pima County, where irrigation has been carried on without cessation since the first settlement, more than fifty years ago, and also in Santa Cruz County.

In Navajo, Apache, and other counties containing smaller valleys, storage is equally practicable, as will be seen by referring to the detailed reports from counties.

ENTERPRISES PROJECTED FOR THE SALT RIVER VALLEY.

The most extensive irrigation developments in the Territory has been made in the Salt River Valley, in the country surrounding Phœnix, and comprising the largest contiguous acreage under irrigation in the United States. The valley proper may be said to embrace the lands adjacent to Salt River, between the mouth of the Rio Verde and the confluence of the Salt and Gila, a distance in a direct line of about 40 miles, and extending 15 miles or more on each side of the river for two-thirds of the distance below the Verde. However, the plains extending to the north and west and more or less separated from the valley by broken ranges or hills are commonly classed as part of the Salt River Valley. In this valley the pioneer settlements were made more than thirty years ago and a system of canals leading from Salt River gradually developed, until the entrance of the first railroad into the valley, less than fifteen years ago, when capital in large amounts was quickly absorbed in canal building. More than 300,000 acres were included in the general system which contains more than 600 miles of lateral ditches. It was soon thereafter ascertained that the canal system had been overdeveloped and that all of the 250,000 acres for which irrigation had been attempted could not be supplied with water each year. It has been from the standpoint of the needs of the Salt River Valley, therefore, that the investiga-

IRRIGATING CANAL, MARICOPA COUNTY.

IRRIGATING CANAL, MARICOPA COUNTY.

tion of the storage problem has been made most systematically by the irrigation interests of the Territory.

All collateral questions have been answered in every essential particular. The rich soil, more than 30 feet deep in many places, has been tested most thoroughly and has proved its adaptability to all the diversified crops of the temperate zone. The taxable wealth of Maricopa County, as fixed by the assessment of this year—$9,312,482.50—represents an actual wealth of at least thirty millions, and as this is nearly altogether the outgrowth of the irrigation development of the valley, it speaks eloquently of the conditions under which farming has been conducted despite the insufficiency of the water supply. It is little wonder that the results achieved have been a decided incentive to sustained effort toward obtaining reservoirs for the valley.

Very fortunately some of the most favorably situated reservoir sites in the whole country are located on the streams supplying the valley.

THE RIO VERDE PROJECT.

This enterprise contemplates the storage of water on the Rio Verde, at a site known as the Horseshoe Reservoir. The dam will be 386 feet long at the bottom and 1,250 feet along the crest and 150 feet high above the low-water line. The reservoir thus created will have a capacity of 204,935 acre-feet. The drainage area tributary covers 6,000 square miles. The estimated cost for the Horseshoe Reservoir is $600,000. It is designed to irrigate a tract of public land in what is known as Paradise Valley, comprising about 50,000 acres. Thence it is proposed to extend the canal across the Agua Fria to the Hassayampa River. It is estimated that between the head gates and the Agua Fria 125,000 acres can be irrigated, and the estimated cost of the canal from the reservoir to the Hassayampa River is $1,200,000. Westward of the Agua Fria, and between that river and the Hassayampa, there is an additional tract of 125,000 acres of level and almost unbroken, sandy loam. Two other and smaller reservoirs for the same system are projected for ultimate construction—one at the crossing of New River, 59 miles by canal length from the Horseshoe Reservoir, partly to store the storm waters of New River, which is usually dry, and partly to receive the waste waters from the canal. A dam at this point 150 feet high and 1,800 feet long at the crest would, it is said, impound 100,000 acre-feet of water. The third reservoir contemplated is also subsidiary, and is located west of the Hassayampa. It is to be filled by a lateral from the main canal.

A considerable amount of work has been done on this project by the Rio Verde Canal Company, the completed work including a tunnel 900 feet long. All work has been suspended for some time, the magnitude of the project making it necessary to raise additional capital. The company claims to have sold water rights for about 100,000 acres of land, at prices ranging from $10 to $18 per acre, at the rate of $1 down and the balance in yearly payments, but payment on water rights were, of course, suspended when construction ceased.

THE M'DOWELL SITE.

There is said to be another eligible reservoir site on the Verde River, between the mouth of that stream and old Fort McDowell, which could be utilized for storing the flood waters of the Verde not

impounded by the Rio Verde Canal Company's reservoir, but there is no reliable information at hand from which accurate statements of cost and capacity can be made. This reservoir, if constructed, would be tributary to the lands irrigated from the Salt River.

THE AGUA FRIA PROJECT.

This project comprises two reservoir dams and one diversion dam on the Agua Fria River. The diversion dam, a substantial structure of masonry, has been almost completed by the Agua Fria Land and Water Company. Some canal work has been done and a considerable amount of stone excavated for one of the reservoir dams. Work is suspended pending attempts to raise capital to complete the project. A glance at the map would seem to show that there may be a conflict of interest between this enterprise and that of the Rio Verde Canal Company, but there is little or no basis for that conclusion, as the vast tracts of land available for reclamation under the two systems could utilize all the water that they can both furnish.

The diversion dam, almost completed, is about 80 feet high above bed rock, and 40 feet above the stream bed, and is 650 feet long on top. The canal begins at the east end of the dam, in a 16-foot cut in solid rock, and has been constructed for a distance of 4 miles, whence it is proposed to carry the water across the river in a flume 700 feet long, and thence by canal in a southwesterly direction.

The first reservoir proposed to be constructed lies adjacent to the diversion dam, the distance from the latter to the reservoir dam being only 1¼ miles, and it is claimed that it will have a capacity of 50,000 acre-feet with a dam 100 feet high. Eight miles above the first reservoir site there is another dam site, 262 feet wide at the bottom, and but 500 feet wide at a height of 200 feet. It is claimed that the basin lying above this dam would hold 150,000 acre-feet of water, with a dam 150 feet high. This storage system when completed will reclaim 150,000 acres of magnificent land.

THE TONTO BASIN PROJECT.

This enterprise now under promotion by the Hudson Reservoir and Canal Company, and designed to regulate the supply and overcome the periodical shortage of water in the Salt River Valley, is the most comprehensive storage project yet brought to public attention. As an irrigation scheme it is the most ambitious in scope, and in its results will undoubtedly be one of the most far-reaching of all the industrial enterprises projected for the western country. Under existing conditions no other project can have such an intimate bearing on the further development and future welfare of the Salt River Valley. Among all the irrigation systems with which I am acquainted, it is unique, in that its main purpose is to supply a country already settled and ready for its service.

Recently the reservoir company has completed contracts with the leading canal companies operating in the valley, agreeing to supply them yearly with impounded water sufficient in quantity, when used with the normal flow of the river, to irrigate all the lands under the canals, estimated at 300,000 acres. It is understood that the canal companies are to pay the reservoir company $1 per acre per annum. I consider that the making of these contracts marks one of the most important steps possible to be taken toward the solution of the water

HUDSON RESERVOIR AND CANAL COMPANY'S DAM SITE IN THE DISTANCE.

problem so far as it affects the Salt River Valley, and assures the permanent and unretarded prosperity of the valley from the time the reservoir is finished. By this means an abundant supply of irrigation water to the valley is assured, since the lands already under irrigation are to be supplied before the reservoir company undertakes the reclamation of lands under canals of its own.

The dam site is on the Salt River, in the mountains, some 60 miles northeast of Phœnix, at the point where the river, leaving the Tonto Basin, enters a deep, narrow gorge in the solid rock, known as the Box Canyon. The gorge is but 200 feet wide at the level of the stream, and for the first hundred feet upward the walls are perpendicular. In the preliminary reconnoissance bed rock was located at an average depth of 25 feet below the stream bed. It is proposed to build a masonry dam which will be 200 feet high above low water, and allowing for waste ways 20 feet deep, will create a reservoir 180 feet deep. The dam will be 650 feet long on top. The waste ways on each side of the dam are calculated to pass, without overtopping the dam, the greatest known flood, that of 1891, when the discharge during part of one day was equal to one-half of that running over Niagara Falls.

The reservoir site, covering over 18 square miles, is likewise ideally located by nature. Into this basin is carried the run-off from a drainage area of nearly 6,000 square miles, most of which is within the region of the greatest precipitation in the Territory. The greater portion of this watershed has a rainfall of 15 to 20 inches and upward, annually. It requires but 3½ inches depth of run-off from this shed, or 20 per cent of 16 inches of rainfall, to produce 1,000,000 acre-feet. The storage capacity of the reservoir is limited only by the height of dam which it is practicable to build, and the capacity of the reservoir which will be created by the dam projected will be stupendous—no less than 757,000 acre-feet, or 32,670 million cubic feet of water. It is conservatively estimated that the 757,000 acre-feet thus stored will be ample for the irrigation of 500,000 acres of land. That the company is fully warranted by the water supply in constructing a reservoir of this enormous capacity can not be doubted. Measurements of the flow of Salt River during a period of years show the run-off to have been as follows:

	Acre-feet.
1889	1,134,780
1890	1,659,500
1891	2,000,000
1892	663,000
1893	1,000,000
1894	277,700
1895	1,124,000
First half of 1896	226,248

With a dam storing 757,000 acre-feet, the reservoir would have passed through this cycle of dry and wet years and supplied 750,000 acre-feet in every year but 1894 (said to be the driest year on record), when it would have yielded, with the water carried over from the previous year, nearly the quantity without emptying the reservoir.

Under the land act of March 3, 1891, the Government has granted the site to the reservoir company. From the dam site to the irrigated region of the valley, a distance of about 30 miles, the river flows through a canyon, and the company has appropriated, under the Territorial laws, this channel as its canal for conveying the impounded water.

It appears to be a very reasonable estimate that after meeting the requirements of the existing canal systems the reservoir will have a surplus of water sufficient for the irrigation of 200,000 acres of public land, thus making the total acreage served by it fully 500,000.

In the 200,000 acres of vacant land, for which this reservoir will be available, the Gila River Indian Reservation may be included to the extent necessary to supply the Indians with water, as Congress has granted to the Hudson Reservoir and Canal Company a right of way for its canal across that reservation, conditioned on the company supplying the Indians with water "on such fair and reasonable terms as may be prescribed by the Secretary of the Interior." To supply the Indians it would be necessary for the reservoir company merely to build a canal from the terminus of the Consolidated Canal, which is near the northern line of the reservation.

The estimated cost of the Tonto Basin dam, complete, is $2,500,000. The plans are so drawn, however, as to permit of building the dam in two sections, so that in case of difficulty in procuring funds sufficient to build the dam to the ultimate height projected, the first section may be built to a height which will impound 300,000 acre-feet of water, the second section to be completed thereafter as convenient. But the indisputable merit of this enterprise should make it no difficult undertaking to obtain in the beginning all the capital necessary for construction.

Vitally important as this project is to the irrigation and all other vested interests in the Salt River Valley, the Globe copper mining district and the mining region between Globe and the dam are little less interested. To the mines and smelters of that locality the high cost of fuel is a serious hindrance to development and profit. Wood appears to be an exhausted quantity, practically, and coal costs $12 per ton. The estimated average cost of producing a horse power for one year is $187.50 for fuel alone.

Cheap electrical power would wonderfully stimulate the mining industry in that locality, and the reservoir company claims that it will develop a water power which will produce 10,240 horsepower, of which 6,768 horsepower can be transmitted electrically to Globe, 35 miles distant. I have received no estimate from the company of the cost of installing their electric power and transmission plant, but that it can be done at a cost not prohibitive of profitable operation I have no doubt.

THE DUTY OF THE GOVERNMENT.

In my opinion, the Government can and should come to the aid of the arid regions in a most effective way. It can be shown that, without expense to the National Treasury, an outlet can be provided for the surplus and home-seeking population of the East by making the desert lands habitable and productive; it can be shown that by exercising a wise policy at this time respecting the arid lands, the growth of the West—phenomenal as it has been through three decades—can be maintained indefinitely; it can be shown that these lands can be converted into a field for the enterprising young men of crowded communities equal or superior to that afforded by the Middle West during the years following the civil war. The question is a most important one for the consideration of Congress.

In this Territory it is possible to store the flood waters of the streams and thereby increase many fold the volume of water for irrigation. It is possible for the Government, without expense to itself,

to aid effectually the rapid reclamation of the irrigable lands within this Territory.

It is my belief that this great problem would be best solved by the cession of the public lands to the Territory. Once placed in control of these lands, our people, acting through their legislature, would be in a position to raise the necessary capital wherewith to construct the needed reservoirs.

Without water the lands can never have a value. They are absolutely worthless. As a rule the desert lands in the valleys are wholly unfit for even the most meager grazing. The Government derives no revenue from them, and never will, because practically all of the area which can be reclaimed through ordinary methods has been filed upon. That remaining vacant will, for all time, be in the hands of the Government—a worthless asset. Treating this subject briefly in my report for 1898, I said:

> If it were possible to secure sufficient financial help from the General Government, to be expended under suitable regulations, to build canals and reservoirs for the reclamation of the arid lands of the West and thereby rapidly develop and populate the now unoccupied and unproductive sections, I would earnestly favor such a plan; but experience has taught us that Congress will not appropriate large sums of money for such a purpose, and the constituents of the members of Congress from the East and Middle West do not want their Representatives to appropriate money for which they will be taxed to bring into competition with them large areas of new farm lands; besides, any system which could with propriety be adopted under the usual governmental restrictions would be cumbersome and difficult of operation. I am therefore firmly of the opinion that the quickest, best, and most satisfactory way to secure the reclamation and occupancy of the arid portions of the country is to cede the lands to the States and Territories in which they lie, so that the question of disposition and development may be one for local legislation.

And the conclusion then stated has been fully supported by the proceedings of Congress during the last session. I regard it as hopeless to expect that the Government will embark upon a general policy of reservoir construction; and however equitable the premises upon which the request for that form of governmental assistance may be, it does not appear that any solution of the question can be hoped for in that direction.

It is true that one or more of the storage enterprises heretofore projected for this Territory appear to be on the eve of success, owing to the peculiar individual merit with which nature has endowed them and on account of the patient and persistent manner in which the effort has been carried forward to promote them, but their success will not satisfy all the needs of the Territory, and will leave the broader problem still unsolved. While the objections raised by the farmers of the East and Middle West to the appropriation of money for the purpose of promoting irrigation and developing competitive farm lands are unworthy and not deserving of consideration, yet they have considerable effect east of the Mississippi. No one can deny the great importance to the entire nation of the reclamation of the arid public lands, and few questions deserve more careful and effective consideration by Congress. There is no division of opinion in the West upon the question of Government help in reclaiming the arid lands, except as to the method. The people are unanimous in requesting Federal aid, but they are divided in opinion in some localities as to how that aid can be best extended. Some argue that a department or bureau of irrigation should be established by the Government to be conducted under the direction of the Geological Survey, and that the feasible reservoir and canal sites should be surveyed and located

by the officers of the department or bureau, and the lands under them reserved from entry pending construction, the money for construction to be obtained in continuous appropriations by Congress. This is the same old plan which was inaugurated in 1888 and now, as then, has a powerful lobby behind it, presumably working in the interests of parties who expect to be beneficiaries of the legislation if secured. The original plan was a failure, and Congress repealed the partial legislation which had been secured in its behalf. A careful analysis of the question ought to convince any reasoning mind of the utter impracticability of the system proposed.

In the first place, it is contended—and properly, I think—that the Government will never go into the business of reservoir and canal building and the distribution of water, except in specific cases of extraordinary merit and where the Government has collateral interests involved, such as the furnishing of water to Indian reservations. If the policy of building and operating canals and reservoirs were to be adopted by the Government on a sufficiently comprehensive scale to cover the entire arid West, it would involve the appropriation of hundreds of millions of dollars and require continuous appropriations for a long period of years, while the holding back of the settlement of the lands during the construction of water-storage systems, under the usually slow procedure of the Government, would retard instead of hasten the growth of the country. Not only that, but complications would certainly develop over questions of jurisdiction between the State and General Government and the interests of farming communities where crops are raised by natural rainfall and localities where the Government would be engaged in the business of irrigation. It would be as proper for the Government to engage in farming the lands reclaimed. It is not claimed that the Government will speedily construct the desired reservoirs and canals and turn them over without cost to the State or communities served. A large force of employees would be necessary, an embarrassing responsibility would be assumed, and an entirely new policy be required on the part of the Government. The foregoing are a few of the reasons why it is believed by many that aid upon the plan outlined can not be expected. It has been argued that the Fifty-fifth Congress very nearly appropriated $300,000 for water-storage enterprises. I regret very much that the appropriations were not made, as they were proposed for specific enterprises of accepted merit, principally in Wyoming (there are equally meritorious propositions in Arizona), and I believe it to be the duty of Congress to aid in such cases; but if $300,000 were to be distributed all over the arid West (and probably one State has as much right to recognition as another) that amount would not be sufficient for preliminary surveying. I am very much in favor of "Federal aid," but I wish the aid to be so effectively extended as to insure the maximum benefits. I advocate most earnestly the cession by Congress of the arid public lands to the States and Territories in which they lie, subject to suitable restrictions, similar to the provisions of the homestead law, or such other safeguards in the interests of actual settlers as Congress in its wisdom may see fit to impose. And after the lands have been ceded, the arid lands, States, and Territories should be aided further by Congress in the construction of specific and meritorious water-storage and irrigation systems in different localities with as much reason and justice as rivers and harbors are improved throughout the nation.

It is urged by the opponents of cession that the Carey Act, erroneously supposed by many to cede 1,000,000 acres of land to the State of Wyoming, was a failure, and did not result in the reclamation of any considerable amount of land. To correct the misinformed, it is proper to state the cession of the million acres under the provision of the Carey Act was conditioned upon reclamation, and title could not pass until after the land had been reclaimed. The State of Wyoming did not wish to go into the business of reclaiming lands as a State any more than the United States wants to engage in that occupation as a Government business.

Had the million acres been actually ceded, no doubt the State of Wyoming through its legislature could have adopted such a policy as would have insured the reclamation and occupancy of the lands.

LOCAL AID AND ENCOURAGEMENT TO STORAGE.

The energetic, resourceful, and self-reliant spirit which characterizes the people of Arizona has led them to do all within their power to promote storage enterprises. Corporations and individuals have done a large amount of troublesome and expensive preliminary work. The numerous reservoir sites have been closely explored and many of them have passed under the searching scrutiny of eminent engineers, and the feasibility of proposed reservoirs has been fully verified. In a few cases construction of some magnitude has been accomplished, but the work has been suspended while efforts are made to enlist additional capital.

Liberal laws have been enacted governing the appropriation of the flood waters and their conveyance through natural channels of the streams to the points of diversion. The work of educating the investing public as to the merits of storage enterprises has been carried on with patience and vigor, and with the return of prosperity to the whole country there have been encouraging indications within the past few months that Eastern capital is at last awakening to the value of Arizona reservoir securities. I have no doubt that final arrangements for the necessary capital for some of the best-known projects will be completed before another year.

Acting in accord with strongly pronounced public sentiment, in February of this year I addressed a special message to the legislative assembly recommending that an act be passed exempting from taxation for a period of years the reservoirs and canals which may be constructed within the next few years. It was pointed out that when reservoirs are constructed they can not fail to increase the taxable wealth and population of the Territory in a very large degree; that the enlargement of the water and irrigation systems of Arizona is an imperative necessity, and that exemption from taxation would encourage capital to come into the Territory and accomplish the necessary work. The legislature was of the same opinion, and passed an act exempting from taxation for the period of fifteen years the reservoirs and canals constructed within a certain time, and the act became a law in April.

Under the various forms of encouragement thus held out the people of the Territory have proved that they are ready to extend a ready and hearty welcome to investors in storage enterprises; and if Congress will add to those local efforts the impetus of national aid, by ceding the vacant lands, the Territory will be in a position to assure

the early construction of a complete and thorough water storage and irrigation system. Moreover, the intelligence, patriotism, and public spirit of the people provide an unquestionable guaranty that the lands would be controlled and disposed of as a sacred public trust and in a manner thoroughly protective of all public and private interests.

STATEHOOD.

The arguments heretofore urged in favor of the admission of Arizona as a State apply this year with added strength. The progress of the Territory in population, wealth, and the development of material resources has been remarkable. The rapidity with which Arizona has developed from a primative frontier region into one of the most progressive, enlightened, and law-abiding communities of the Union is neither understood nor appreciated by Eastern representatives, otherwise the boon of self-government, for which we all pray, would not now be denied us.

The spirit of fairness, so prominent in our national character, would not longer permit Arizona to suffer the wrongs of Territorial vassalage, if the Territory and its people were properly understood east of the Mississippi.

Arizona has 100,000 people and one hundred millions of taxable wealth if it were all assessed.

Every argument and principle which should in justice and right be considered in connection with the admission of the Territories rests simply upon their ability to maintain themselves as States, and the desire of a majority of their people for self-government. No law, precedent, nor construction of law can be found to the contrary, and while no specific regulations exist for the guidance of Congress in the admission of States, the law as recognized by custom and precedent has become a fundamental part of our national policy, that whenever the people of a Territory of this Union express the desire for self-government and can furnish satisfactory proof of their competency in population and wealth, it is not only their right to be admitted to Statehood, but it is clearly the duty of Congress to admit them. This is conceded by all of the authorities on constitutional law and precedent, and any other view is repugnant to the very inspiration and patriotism of the Republic.

The Territory has greater wealth and population than had a large majority of the States when they were admitted, its undeveloped resouces are almost incalculable, and the people unanimously demand recognition of the rights to which they are entitled under the Constitution. The Territorial form of government has existed in Arizona for thirty-five years. The fifteenth legislature of Arizona ten years ago authorized a constitutional convention and the election of delegates thereto, an election was had, a convention held, and a constitution framed, which at a subsequent election was ratified by the people.

These preceedings cost the Territory $30,000, yet Congress would not recognize our just claims. Bills passed the House of Representatives for the admission of Arizona during the Fifty-second and Fifty-third Congresses and were favorably reported in the Senate, and both the Senate and House of Representatives of the Fifty-fourth Congress reported admission bills favorably, yet it has been impossible to obtain the just consideration to which we are entitled.

Statehood has been denied to Arizona because of sectional prejudice, ignorance, imaginary partisan policy, and pure selfishness. The latter

reason exists in the fact that our Eastern brethren are unwilling to divide legislative representation in Congress. They refuse to grant to their brother Americans of the West, who are their equals in every respect, the same privileges under the Constitution which they enjoy, and for which the founders of the Republic fought and bled.

Upon reflection, it is not so very surprising that ignorance and prejudice on this question exist in some of the older sections of the country. The great Webster, with all the power of his mighty eloquence, opposed the annexation of California, and declared the country west of the Rocky Mountains to be a great waste of shifting sands, bordered by 3,000 miles of bleak, uninviting seacoast; and another great New England senator—Winthrop—declared that the people he assumed to represent would be justified in secession if the "Louisiana purchase" were perfected. California is conceded to be one of the greatest and most valuable States of the Union, and within the "Louisiana purchase" there are now nine great States, besides the Indian Territory, Oklahoma, nearly all of Montana, Wyoming, and Colorado. Senator Winthrop opposed, with great vehemence, the annexation of Texas. Time does not seem to have made our New England brothers comparatively very much more expansive and liberal, nor much better informed as to the Western rights and conditions, unless the stirring events of the past year have opened their eyes.

Perhaps, on account of the annexation of Hawaii, and when our national policy is finally determined in regard to the government of territories acquired as the necessary results of an unforeseen and unpremeditated war, our Eastern friends will realize in some degree the importance and magnitude of this nation, and be more willing, "in order to form a perfect union, establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty," to recognize that other citizens of the United States are entitled to be as free as they are, and "hold these truths to be self-evident; that all men are created equal; that they are endowed by their Creator with certain inalienable rights; that among these are life, liberty, and the pursuit of happiness; that to secure these rights governments are instituted among men, deriving their just power from the consent of the governed."

RECOMMENDATIONS FOR CONGRESSIONAL LEGISLATION, AND ACTION OF THE INTERIOR DEPARTMENT.

(1) That Arizona be admitted as a State.

(2) That all the public lands within the Territory be ceded to the Territory or State.

(3) That until the lands are ceded authority be granted to the Territory to lease the grazing lands.

(4) That all the lands within the Territory be surveyed, especially the railroad-grant lands, so that they may be taxed.

(5) That a Government assay office and branch mint be established within the Territory.

(6) That the act of Congress of June 27, 1866, granting right of way to the Atlantic and Pacific Railroad Company, and exempting said right of way from taxation in Territories, be so amended as to permit the taxing of track and superstructures on the right of way.

(7) That the salaries of the Federal judges of the Territory be increased.

(8) That a fifth judicial district be created.

(9) That a commission be appointed for ethnological and archæological research in the Territory, and that a suitable appropriation be made by Congress therefor.

(10) That appropriation be made by Congress to pay the governors and secretaries of Territories the salaries allowed them by law. (Sec. 1845, Rev. Stat., 1878.)

Respectfully submitted.

N. O. MURPHY, *Governor.*

Hon. E. A. HITCHCOCK,
Secretary of the Interior.

APPENDIX A.

OFFICIAL ROSTER.

EXECUTIVE DEPARTMENT.

Governor (appointed by the President), Nathan O. Murphy, Phœnix; private secretary to the governor and Spanish interpreter and translator, Sims Ely, Phœnix; secretary of the Territory (appointed by the President), Charles H. Akers, Phœnix; assistant secretary of the Territory, Harry R. Tritle, Phœnix; Territorial treasurer, Thomas W. Pemberton, Phœnix; Territorial auditor, George W. Vickers, Phœnix; attorney-general, Charles F. Ainsworth, Phœnix; superintendent of public instruction, R. L. Long, Phœnix; adjutant-general, H. F. Robinson, Phœnix.

BOARD OF CONTROL.

Governor N. O. Murphy, chairman; George W. Vickers, auditor; Ephraim J. Bennitt, citizen member; Harvey J. Lee, clerk.

JUDICIARY DEPARTMENT.

Supreme Court (appointed by the President): Chief justice, Webster Street, Phœnix; associate justices, George R. Davis, Tucson; Fletcher M. Doan, Florence; R. E. Sloan, Prescott; clerk, Lloyd Johnston.

District court, first judicial district (comprising the counties of Pima, Cochise, and Santa Cruz): Judge, George R. Davis, Tucson; clerks, Clinton D. Hoover, Tucson; A. H. Emanuel, Tombstone; Samuel F. Noon, Nogales; commissioners, William H. Culver, Tucson; Frank J. Duffy, Nogales; A. H. Emanuel, Tombstone.

District court, second judicial district (comprising the counties of Pinal, Gila, and Graham): Judge, Fletcher M. Doan, Florence; clerks, Daniel C. Stevens, Florence; Frank Dysart, Solomonville; Charles T. Martin, Globe.

District court, third judicial district (comprising the counties of Maricopa and Yuma): Judge, Webster Street, Phœnix; clerks, W. C. Foster, Phœnix, Maricopa County; W. H. Brinley, Yuma, Yuma County; commissioners, C. W. Johnstone, Phœnix; W. H. Brinley, Yuma.

District court, fourth judicial district (comprising the counties of Yavapai, Mohave, Coconino, Navajo, and Apache): Judge, R. E. Sloan, Prescott; clerks, J. W. Watts, Prescott, Yavapai County; L. O. Cowen, Kingman, Mohave County; Charles Keller, Flagstaff, Coconino County; F. J. Watron, Holbrook, Navajo County; John T. Hogue, St. Johns, Apache County.

BOARD OF EQUALIZATION.

M. P. Freeman, Tucson, first judicial district; Michael Ohl, Bonita, second judicial district; George W. Vickers, Phœnix, third judicial district; R. N. Fredericks, Prescott, fourth judicial district; clerk, Harvey J. Lee, Phœnix.

OFFICERS OF THE TERRITORIAL PUBLIC SCHOOL SYSTEM.

Territorial board of education: N. O. Murphy, governor; R. L. Long, superintendent of public instruction; Thomas W. Pemberton, Territorial treasurer.

Board of regents, University of Arizona: Governor N. O. Murphy, ex officio member; M. M. Parker, president; William Herring, chancellor, Tucson; Charles R. Drake, Tucson; Herbert Tenney, Tucson; H. W. Fenner, Tucson; R. L. Long, superintendent of public instruction, ex officio.

Board of education of Territorial normal school: R. L. Long, superintendent of public instruction; Thomas W. Pemberton, Territorial treasurer; James H. McClintock, Phœnix; A. A. Dutton, Flagstaff; T. E. Pollock, Flagstaff.

SUPERINTENDENT TERRITORIAL PRISON.

Herbert Brown, Yuma.

SUPERINTENDENT TERRITORIAL INSANE ASYLUM.

Dr. J. Miller, Phœnix.

LIVE-STOCK SANITARY COMMISSION.

W. C. Barnes, Holbrook, chairman; A. C. McQueen, Mesa; W. F. Nichols, Willcox.

TERRITORIAL VETERINARIAN.

Dr. J. C. Norton, Phœnix.

FISH AND GAME COMMISSIONERS.

J. L. V. Thomas, Flagstaff; John McCarty, J. K. Day.

UNITED STATES DISTRICT ATTORNEY.

R. E. Morrison, Prescott; assistant U. S. attorney, Thomas D. Bennett, Phœnix.

UNITED STATES MARSHAL.

William M. Griffith, Tucson.

UNITED STATES INTERNAL REVENUE COLLECTOR FOR NEW MEXICO AND ARIZONA.

A. L. Morrison, Santa Fe, New Mexico; chief deputy, first division, S. M. Cullom, Phœnix.

UNITED STATES INTERNAL REVENUE COLLECTOR OF CUSTOMS.

H. K. Chenoweth, Nogales.

UNITED STATES LAND OFFICE, PRESCOTT.

F. A. Tritle, register; J. C. Martin receiver.

UNITED STATES LAND OFFICE, TUCSON.

M. W. Moore, register; J. H. Bauman, receiver.

UNITED STATES SURVEYOR-GENERAL.

George Christ, Tucson.

DELEGATE TO CONGRESS.

J. F. Wilson, Prescott.

BOARD OF REGISTRATION IN DENTISTRY.

F. C. Devendorf, Tucson; A. A. Doherty, Nogales; E. C. Hyde, Phœnix; H. J. Jessop, Phœnix; A. P. Preston, Globe.

BOARD OF MEDICAL EXAMINERS.

Winfred Wylie (regular school), Phœnix; D. M. Purman (regular school), Phœnix; George Goodfellow (regular school), Tucson; W. L. Woodruff (homeopathic school), Phœnix; C. W. Woods (eclectic school), Jerome.

CAPITOL GROUNDS AND BUILDING COMMISSION.

E. B. Gage, Prescott; Walter Talbot, Phœnix; Frank H. Parker, Phœnix.

APPENDIX B.

GENERAL CONDITION AND PROGRESS OF THE TERRITORY AS REPORTED BY COUNTIES.

MARICOPA COUNTY.

County seat, Phœnix.

County officers—Supervisors: J. T. Priest, J. A. Marshall, J. R. Norton; sheriff, D. L. Murray; treasurer, M. W. Messenger; recorder, F. W. Sheridan; district attorney, Thomas E. Flannigan; probate judge, N. A. Morford; county school superintendent, A. H. Fulton; assessor, L. W. Coggins; clerk board of supervisors, John Gray.

The county of Maricopa lies in the south central part of the Territory and was created in 1871 from a part of Yavapai County but notwithstanding its age as a county Maricopa is really young as to development. Its settlement and growth as a modern community dates from the advent of the railroads. The county may be said to be less than two decades old. It embraces within its boundaries the great Salt River Valley, the fame of which has extended to all parts of the world. This county contains one of the largest tracts of irrigable land in the United States, estimated to be over 1,500,000 acres. The surface of this irrigable area is remarkably level, sloping by easy gradients to drainage streams with which the entire county is abundantly supplied. From the northeast to the southwest, through the valley, flows the Salt River (a misnomer, as far as its saline properties are concerned), to a distance of about 20 miles southwest of Phœnix, where it joins the Gila, which changes its course from west to southwest, crosses the western boundary line of the county, and enters the Colorado River at the town of Yuma.

The topographical features of the county are most pleasing. The northeast and east is one continuous range of mountains and foothills, while through the valley are many curiously formed peaks, all of which go to diversify and beautify what has been most truthfully designated as the most lovely valley on the American Continent.

SOIL AND CLIMATE.

The soil in the Salt River Valley is incomparable in its productive capacities. In fact, it is limited only in this respect by its water supply. The mesa land is gray sandy loam, while nearer the stream it changes into a dark rich soil, admirably adapted to the growth of alfalfa, wheat, barley, and all kinds of vegetables, sugar cane, watermelons, etc., while the lands of the mesas have demonstrated that for the growth of oranges, lemons, and all citrus and deciduous fruits they have no equal in this or any other country. The soil when irrigated is a rich alluvium, and is of marvelous depth, and the waters which give life to the plants and trees in this garden of the New World, not unlike that of the Nile, carries a large percentage of sediment which is incomparable as a fertilizer and continually enriches the soil cultivated.

The Senate of the United States appointed a special committee to examine into the possibilities of irrigation, and they passed several days in the intelligent examination of the soil, climate, and agricultural conditions of the Salt River Valley. In their report we find on page 60 the following testimony: "A careful analysis of this soil shows its fertile qualities to be superior to the Nile earth." When we think of the early history of civilization, its marvelous growth and development, and then realize that civilization and ancient greatness had its high tide along the course of the Nile, we marvel at the future of this new Eden of the West. Most of this valley's soils are the accumulated washings from the surrounding hills, made up of the fine particles that have been, during countless centuries, disintegrated by frost or the elements. The water is also charged with new fertility.

One fact here may show the value of irrigation as a fertilizer. The Pima and Maricopa Indians along the river in this valley live by farming and stock feeding. The system of irrigation used by them for centuries is of the rudest nature, yet they have always been self-supporting, never having cost the Government a dollar. They have no tradition running back to the time when their ancestors did not cultivate these valleys, sowing from year to year the some variety of wheat, never changing the seed in all these years, and neither the grain nor the soil shows signs of exhaustion. No wheat of greater beauty nor of more excellent quality can be found.

SPECIAL ADVANTAGES.

The Salt River Valley has many advantages besides its climate, soil, and conditions. It is six weeks earlier in the market with apricots, grapes, oranges, and peaches, thus sure of securing a ready sale for its products. The early fruits always command the highest prices and most ready sale.

The extensive fields of alfalfa in this valley afford fine opportunities for the fattening of stock, of which the stockmen of the various counties have taken advantage, and this is a source of great profit to the farmer.

In this southern territory is the coming agricultural empire of the continent. Palmyra of old, Egypt in the days of the greater Rameses, and the plains of greater India must be brought to mind before the infinite possibilities of the region can be even dimly comprehended. Along a single Arizona river is a greater arable area than in all the lately acquired Hawaiian Isles. In the single valley of the Salt, where 250,000 acres partially cultivated maintain a population of 80,000, are yet untouched a million acres, susceptible of irrigation and as well fitted by nature for agricultural production as are any of the acres already sown. This development to the extent of the arable land will come with the conservation of the flood waters of the Salt, as a similar and no less phenomenal change will come through the same means to the upper and lower valleys of the Gila River.

The soil of the great undeveloped plains or deserts is almost uniform. Near the stream channels are to be found strips of clay-like black adobe, with occasional streaks of alkali, containing varying proportions of mineral salts. The upper-lying land is lighter, though it is not to be classed as less rich. It abounds in lime, particularly in lime sulphate (gypsum). It is lacking in two elements, vegetable humus and iron. Both are readily secured by cropping for several years to alfalfa. Thus prepared, through the planting and plowing under of alfalfa, the land is at its best.

Alfalfa is king in the southland. Of this there can be no dispute. Around about Phœnix 60,000 acres are planted to it, and rich is the owner of a farm thereof. The past season was a mortgage lifter with the alfalfa raisers of the Salt River Valley. Crops were good; those of California were poor. The local granger, till rain came to the Golden State, loftily declined tenders of less than $12 a ton for his baled hay, delivered on the cars. It had cost him about $1 a ton to cut and stack and little more than that to bale. This condition, however, was rough on the Arizona cattlemen, who annually drive their feeders to Phœnix. Fewer cattle, by far, were brought to the valley, for pasturage rates rose, and cut alfalfa is rather dear fattening material at a dozen dollars a ton.

A farmer can and does, in average seasons, clear from $10 to $25 an acre from his easily attended alfalfa field. Better than that few farmers do anywhere. The newcomer will hear tales of single cuttings of 5 tons of alfalfa to the acre, and again of five cuttings per annum. The tales are true, though such records are rare. A common crop is 6 tons to the acre, and three cuttings. Compute this at $5 a ton in the stack, and you figure up a very decent income for a man with a 160-acre ranch. The labor bill is a light one. The farmer and one hired hand, with a couple of extra men and a hayrake boy in summer, do all the business. If he wants more income and more work, he buys a hundred head of lean mountain cattle and feeds them to fatness. As a rule, the farmer who does this doubles his investment, marketing his crop on its own feet, instead of by weary wagon haul.

All over the Salt River Valley is to be found the prosperous man who owes his plenty to alfalfa. South of Tempe there lives a farmer who fifteen years ago worked for $26 a month when he was fortunate enough to get work. To-day M. Ellingsen, in lands, water shares, and town property, is worth more than $100,000. Every dollar was made out of the Chilean clover, planted on two quarter sections of good land. A dozen similar instances might be cited. And the same can be done to-day and to-morrow. The demand for alfalfa must last as long as humanity eats beef.

If ever there was a lazy man's crop it is alfalfa. In the summer it pushes the granger hard, but the rest of the year he needs do little save attend to his fences,

APRICOTS.

Realizing these many advantages, a few of our most progressive farmers on either side of the river have combined to profit by these conditions. For some five years the Tempe-Mesa Produce Company has been in successful operation.

Less than three years ago was organized the Maricopa Creamery Company, which has been in successful operation for the past two years. It is organized upon a cooperative basis, the stock in the main being held among the farmers and dairymen. By hard work and careful management the beginning of a great industry in our valley has been put upon a solid business basis. The milk producers have been treated fairly, and at the same time the stockholder has realized a small per cent for the use of his money. In the meantime a trade has been secured which far exceeds the productive capacity of the present herds to supply. There is no question but that the man who goes into the dairy business and handles it with business sense, such as is necessary for success in anything, will realize handsomely upon his investment, whether that investment be brains and specialized skill, careful, conscientious labor for another, or the capital of the investor seeking a fair interest upon his money in a perfectly safe business.

HORTICULTURE.

Ever since the first irrigating canal was taken out of the Salt River in 1868 fruits have been raised here for family use; but as the valley had no connection by rail with the outside world, there was no incentive to plant orchards and expect a commercial return. The completion of the Maricopa and Phœnix and the Santa Fé, Prescott and Phœnix railways, however, gave the valley markets both east and west, since which time the acreage of all kinds of fruits has been constantly increasing, and fruits raised in this valley have been marketed from Augusta, Me., to Los Angeles. Fresh apricots, grapes, oranges, pears, almonds, peaches, watermelons, dried fruits, and pickled olives have been shipped in carload lots for the past three years. This valley also supplies all points in Arizona by shipments with all varieties of fruits, and has shipped early apricots and watermelons even to California. There are about 800 acres in the valley planted to apricots. The principal varieties are the Royal, the Moorpark, and the Newcastle. Apricots here are regular bearers, and every year the trees bear more fruit than should be permitted to mature. This is one thing that the orchardists here, as elsewhere, are slow to learn. If the fruits on the trees were thinned soon after it formed, not only would the remaining fruit be much larger in size, but the quality would be finer. Several new varieties of apricots, of larger size and better flavor than the standard varieties, have been introduced in the valley. The fruit of the Elvey seedling, first grown by Mr. T. K. Elvey, of this valley, is large and of fine flavor and the trees bear regularly. There are also a few trees of a variety something similar to the old peach-apricot, but the fruit is of much finer quality and larger in size and is probably similar to the Routier apricot, recently introduced into California.

Apricots ripen here early in May, which is some three weeks earlier than the California apricot matures.

Apricot trees are set 109 to the acre, and when in full bearing ought to average over 200 pounds per tree. Three hundred to 350 pounds is nothing uncommon for a full-grown tree. Several carloads of apricots have been shipped East in refrigerator cars. Owing to the perishable nature of the fruit, however, it is considered more satisfactory by many horticulturists to dry the fruit and dispose of the crop in that way. Rain is almost unheard of during the time when apricots mature, which gives the growers here an opportunity to dry their fruit under ideal conditions. Four or 5 pounds of green fruit will make 1 pound of dried fruit, which sells for about 8 cents per pound.

The better variety of peaches here bear regularly. The Salway is one of the most satisfactory varieties. It grows very large, has a fine flavor, and is suitable for canning or drying. The Strawberry peach and the Orange and Lemon Clings are all fine-flavored fruit of beautiful appearance, and do well here.

The principal varieties of pears raised are the Bartlett and Winter Nellis. Both bear regularly and abundantly and are readily marketed, both green and dried. The Winter Nellis pear is very hardy and will stand very rough handling. After picking they can be packed into barrels, and if necessary shipped to Liverpool.

Almond trees grow rapidly, commence to bear at 3 years old and are in full bearing at 8 years of age. The best varieties are Ne Plus Ultra, I X L, Nonpareil, Paper Shell, and Smith Seedling. This latter variety was discovered and introduced by Mr. A. H. Smith, of this valley, who claims that it blossoms later than other varieties and for that reason is less liable to frosts in exposed places in the valley. Full-grown trees will bear 60 pounds of almonds and over to the tree

watch the fattening of his kine, and market the butter his good wife makes. He will irrigate about as often as the Zanjero will let him.

Yet there are farmers in Arizona's southern valleys who get along with only enough alfalfa to properly keep two horses, a cow, and a run of chickens. Wheat and barley are usually profitable, and when properly sown and intelligently irrigated, produce from 1,500 to 2,800 pounds to the acre. Both of the cereals, to secure the best results, should be sown before the Arizona winter sets in, and return the heaviest yield when sown in ground that has been irrigated and then plowed. The plowing is advisable in all cases, even when the land is new and as light as an ash heap. If irrigated after sowing the silt of the water and the lime of the soil form a crust through which the shoots find difficul' egress. Barley is raised in the southwest for horse feed, taking the place of oats. Oats, save under exceptional circumstances and with northern-grown seed, fail to mature their grain, though the wild oats grow luxuriantiy and is esteemed for hay.

Corn of whatever variety does best when planted in the middle of summer after the grain crop is off, yet is rarely a complete success. The main trouble lies in the lack of vegetable matter (nitrogen) in the soil. This was well demonstrated two years ago, when E. G. Frankenburg, a south-side farmer, raised 80 bushels of corn to the acre on an old alfalfa field he had plowed up for reseeding.

Almost to infinity is the list of special field crops that may be raised in the irrigated valleys. Perhaps in days to come sugar beets will occupy in acreage the place next below alfalfa. Thus far it is believed the best methods of sugar-beet cultivation have not been discovered, though one variety of beet, the Klein-Wanzlebener, has been fixed upon by the American agricultural experiment stations as best adapted to local conditions. In saccharine strength and purity the best Arizona beets have thus far come from localities with altitudes above 2,000 feet. Sugar cane thrives in all luxuriance, as does sorghum. Both have been utilized in the manufacture of molasses. Sorghum is one of the most profitable crops when grown for fattening cattle. The feeder secures the quickest and most economical results who combines sorghum with alfalfa hay.

DAIRYING.

Statistics show that among the many great industries of the United States the dairy interest is one of the most important. Nine hundred millions of dollars of annual production, distributed among thousands of producers, creamery men, cheese makers, dealers, and laborers in every department of the work, must indeed prove a material factor of general prosperity. It is also a known fact that no class of people are more uniformly successful than the dairymen, and no sections of our country present so many visible signs of permanent prosperity as those sections devoted to dairying.

If accurate means were at hand to secure perfect statistics, the value of the milk product of this country would probably prove to be close upon $1,000,000,000 annually—more than twice the value of the wheat crop of the entire country.

But what part have we of this valley in this great industry? It does not take a very old resident to remember when milk from a few range cows, set in tin pans, skimmed with a tin skimmer, churned in a dash churn, the product misnamed butter, taken to market in tin fruit cans, constituted the dairy output of Maricopa County. The misnamed product was bartered to the local grocerymen, for, I will not say a small price, although it could not be sold to-day at any price. It brought a good price then because it was all there was to be had.

But the dairy industry has grown from nothing until to-day it is one of our leading sources of income, bringing into the valley not less than $100,000 annually, and contributing an annual product of no less than $125,000. In fact, some conservative men place it much higher. But this much at least is known from figures based upon actual weights.

Naturally it is asked what are some of the factors which have contributed to the building up of this industry?

First, the mild and equable climate of our valley has proven the natural home for the dairy cow. Freed from the excessive cold and severe storms of other sections, she will produce larger returns and give in milk more continuously. Then, again, our luxuriant alfalfa comes as near being a balanced ration as anything known—that is, as one thing. That being true, naturally our cows need never be hungry. This feed, combined with sorghum for a part of the year and the fresh green grainfields for the winter months, with plenty of hay at all seasons, leaves little to be desired for the highest productiveness at the least cost. Then, to give impetus to the business, comes the fact that we are surrounded in our own Territory with a market which as yet we are in no wise able to supply.

Realizing these many advantages, a few of our most progressive farmers on either side of the river have combined to profit by these conditions. For some five years the Tempe-Mesa Produce Company has been in successful operation.

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Apricots ripen here early in May, which is some three weeks earlier than the California apricot matures.

Apricot trees are set 109 to the acre, and when in full bearing ought to average over 200 pounds per tree. Three hundred to 350 pounds is nothing uncommon for a full-grown tree. Several carloads of apricots have been shipped East in refrigerator cars. Owing to the perishable nature of the fruit, however, it is considered more satisfactory by many horticulturists to dry the fruit and dispose of the crop in that way. Rain is almost unheard of during the time when apricots mature, which gives the growers here an opportunity to dry their fruit under ideal conditions. Four or 5 pounds of green fruit will make 1 pound of dried fruit, which sells for about 8 cents per pound.

The better variety of peaches here bear regularly. The Salway is one of the most satisfactory varieties. It grows very large, has a fine flavor, and is suitable for canning or drying. The Strawberry peach and the Orange and Lemon Clings are all fine-flavored fruit of beautiful appearance, and do well here.

The principal varieties of pears raised are the Bartlett and Winter Nellis. Both bear regularly and abundantly and are readily marketed, both green and dried. The Winter Nellis pear is very hardy and will stand very rough handling. After picking they can be packed into barrels, and if necessary shipped to Liverpool.

Almond trees grow rapidly, commence to bear at 3 years old and are in full bearing at 8 years of age. The best varieties are Ne Plus Ultra, I X L, Nonpareil, Paper Shell, and Smith Seedling. This latter variety was discovered and introduced by Mr. A. H. Smith, of this valley, who claims that it blossoms later than other varieties and for that reason is less liable to frosts in exposed places in the valley. Full-grown trees will bear 60 pounds of almonds and over to the tree.

APRICOT ORCHARD.

PEARS, SALT RIVER VALLEY.

Last year growers received 10 cents per pound in Phœnix. The largest and most profitable almond orchard in the West is owned by Mr. E. J. Trippel, of Mesa, Ariz.

The Salt River Valley is undoubtedly the ideal home of the grape. Among the varieties suited to this climate are the Muscat, Malaga, Thompson Seedless, Rose of Peru, Mission, and Sultana. They bear abundantly every year. A failure in the grape crop is absolutely unknown. To a person unfamiliar with conditions in a country like this the average yield seems phenomenal. A full-grown Thompson Seedless vine will bear in weight half as much fruit as an apricot tree, and when it is remembered that the vines are set about 500 to the acre it will be readily understood that a man with 10 acres of grapes will have something of a crop to harvest. The seedless Sultana when dried makes the commercial California currant. The Muscat is a raisin grape and needs no introduction to our readers, as that has been the standard raisin grape of Italy and France, as well as California, for many years. The long warm summer of Arizona, which gives our oranges their exquisite flavor, also puts sugar in the grapes, which is one of the requisites for first-class raisins. For the same reason here grapes are too sweet to make good dry wines, but are well adapted for making the sweeter wines and brandies.

Arizona strawberries have more than a local reputation. Express shipments are made from Phœnix from spring to fall of a quality of berry which equals, if not surpasses, berries from any other locality in the world. The Arizona everbearing strawberry, which was first propagated in this valley, is now on every nursery list in California.

In California, Italy, and France olive trees come into bearing when about 10 years old. The oldest olive trees in the Salt River Valley are only 6 years old, and last year bore abundantly, which was all the more notable as the California crop in that year was a complete failure. The olive is a comparatively hardy tree and seems to thrive well on sandy, rocky soil, but responds in yield to richer soil. The principal varieties so far planted here are Manzanillo, Navadillo, Mission, and Columella. The Manzanillo and Navadillo are the heaviest bearers, the Manzanillo being the best pickling olive, and the Navadillo is the best adapted to oil. These two varieties begin to ripen the latter part of August, which is about two months earlier than the same varieties mature in California. Both pickling and crushing for oil are comparatively simple processes, and there is no reason why Arizona should not produce as fine olive oil and pickles as are made in the world. Three carloads of olives were pickled in Phœnix last fall and shipped to Eastern markets.

While during the past three years Arizona has become well known in many sections of the country as producing very fine deciduous fruits, yet it is through her citrus fruits, and especially her oranges, that Arizona has gained special distinction outside of her own borders. Salt River Valley oranges are well known in the markets of New York, Boston, Chicago, Philadelphia, and other Eastern cities. A large commission house wrote to a dealer here last fall that the finest oranges received in that market during the season were from the Salt River Valley. At the California Midwinter Fair Salt River Valley Washington navel oranges received a first-premium gold medal for excellence, and this after being picked for two months and shipped a thousand miles. Not alone are the Washington navel oranges of the Salt River Valley as fine in quality as any grown, thin skined, sweeter than those from California, as juicy as a Jamaica orange, and more highly colored than those from the Indian River country of Florida, but, what is more important than all to the grower, they are the earliest navel oranges to ripen in the United States. Orange picking commences in the valley early in November and lasts until after the holidays, the latest varieties ripening in January. California navel oranges ripen the latter part of December, January, and February. Last year the Ingleside Company had a carload of navel oranges in the Chicago market nearly a week before Thanksgiving.

Many varieties are raised here, including the Washington navel, St. Michael's, Jaffa, Heart's Tardiff, Mediterranean Sweets, and Parson Brown. The navel is of course the popular variety in the markets of the East, and are our largest and finest fruit. They do not, however, bear quite so heavily as some other varieties. Blood oranges, while much smaller than the navel, have a distinct and excellent quality, and have many friends. The little Japanese "Kid Glove" oranges, the Mandarin and the Tangerine, bear regularly and well here, and are quite profitable.

The orange is a very long-lived tree. In California and the countries surrounding the Mediterranean orange trees bear regularly up to one hundred years, and there seems to be no reason why they should be shorter lived here. Trees come

into bearing here at three years, after which time the yield will probably increase steadily up to twenty-five years.

The great freezes which for two successive seasons have devastated the entire State of Florida seem to demonstrate the fact that there is no citrus belt in this country outside of Arizona and California. During last winter, which was an unusually cold one, not a tree was damaged in the citrus belt of this valley.

There are 1,000 acres now planted to oranges. About 50 acres on the south side of Salt River and the balance along the foothills, commencing at a point about 6 miles due north of Phœnix and running east to the east end of Camel Back Mountain. The largest grove in the valley is owned by the Ingleside Company. It lies directly south of Camel Back Mountain and is under the Arizona Canal. This grove is the oldest in the valley, contains about 100 acres, and is planted almost entirely to Washington navel oranges.

The foreman of the Ingleside grove estimates that the yield on the oldest trees will average about 250 boxes per acre.

There is a very fine group of citrus groves about a mile and a half west of the Ingleside grove. This includes Mr. W. J. Murphy's grove of Washington navels and grape fruit, Dr. Hardy's grove of Jaffas and Mediterranean Sweets and Mr. Ward's grove. Mr. Ward, perhaps, cultivates more different varieties of citrus fruits than any other grower in the valley. His orchard includes grape fruit, tangerines, Jaffas, Mediterranean Sweets, and lemons.

The nearest groves to Phœnix are in the suburb of Orangewood, on Central avenue, about 6 miles north of Phœnix. There are at present 10 orchards in this attractive suburb and are planted almost exclusively to Washington navel oranges. Many of these groves are owned by retired business men, who expect to make their orange groves the site of ideal homes. The oldest of these groves belongs to Dr. Mulvane, a prominent physician of Chicago, who plans to make his future home in this valley. All of these groves are in a high state of cultivation and give promise of large returns when the trees come into full bearing.

There is a great future in this valley for the propagation of pomeloes or grape fruit. Grape fruit ripens here very early, and there are some varieties which can be put on the market fully matured at Thanksgiving. At that time last fall grape fruit was selling in New York and Chicago at $8 per box. It needs no expert mathematician to compute profits at these figures. Grape fruit bears regularly and well here, and the varieties so far introduced seem really to improve under the conditions they find in this valley. Some of the growers here are experimenting with a seedless variety, which gives good promise of success.

Lemons have been propagated on a small scale for several years, and do very well. The profits in them, however, are smaller than in oranges and pomeloes, and for that reason they have not been extensively cultivated.

The Salt River Valley enjoys the distinction of being the only place in the United States where dates can be successfully raised. The date palm tree flourishes in southern California, but does not fruit. Only the female or pistillate tree bears, which has to be fertilized from the pollen of the blossom of the male or staminate tree. All the female trees over 6 years of age in the valley bear regularly when pollenized. Several bunches of dates were shipped in 1897 to the horticultural fair in Madison Square Garden. The quality of the dates was highly commented on, and they were one of the unique features of the fair.

In addition to the above named, many other varieties of fruit are grown in the valley, and while excellent in quality, are not so extensively raised as the kinds mentioned. Plums deserve special mention. All of the finer California varieties are grown and do well. The Prunis Simona is a delicious fruit, large, of a golden straw-color, changing to a deep crimson. The Wickson is a little smaller, being about the size of the Kelsey Japan, and is a delicious fruit, either eaten ripe or for canning purposes. The Wickson plum begins to bear at 2 years old, and is in full bearing at four or five years, when the average amounts to over 150 pounds per tree. The white or Smyrna fig of commerce is grown in the valley, but the trees bear irregularly, and there is but little profit in raising them. The black or purple fig bears abundantly and has two or three crops every year. It makes a fine table fruit and a jam par excellence.

Loquates, guavas, Japanese persimmons, and other kinds of what might be termed fancy varieties of fruits have been grown to a limited extent.

ALMOND CULTURE.

It has been demonstrated beyond a doubt that the culture of the almond is destined to be one of the leading industries of this valley. It is well to assert the fact that whoever enters into this line of horticulture and hopes for success must bring to bear upon his work the same keen perception that he applies to any other

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ALMONDS.

business venture. Simply planting a tree and putting in time figuring out results wont produce almonds. He must be as familiar with his trees as the turfman with his horses. Constant study and observation is the only road to success. By the authority of expert testimony this valley claims superiority over the California product in the following points: Color, and plumpness of kernel and flavor. The tree under proper care is a rapid grower and is a bearer at three years. The leading varieties are the Ne Plus Ultra (paper shell) I. X. L. (soft shell), and Arizona Prolific (hard shell). So far the I. X. L. stands at the head of the list.

There are no insect pests to affect the growth or bearing. The only drawbacks are crown-knot and March frosts. Both are under control of the orchardist. The former is more or less the result of the haphazard methods so common throughout the valley. Ignorance has left footprints all about us, and would stamp out horticulture enterprise if left to its management. It has been practically proven that the effects of March frosts can be counteracted by the use of smudge fires, insuring each year a crop.

Our trees are still young, yet several carloads have gone into the Eastern market, and their superior quality has created a demand that will readily take all that will be grown, at the highest market price. In many sections of the valley the soil is perfectly adapted to the almond. Porosity of soil is the first requisite, which is also true of all the fruits. In the cultivation no mathematical rule can be laid down. There are certain elementary principles that are essentials in all plant growth. These principles form the foundation—intelligence does the rest. Because a man can gee and haw through a corn field does not make him an orchardist. The best results in California have been achieved by men from the professions and the counting rooms. There is an open field for this class with everything in favor of successful results. Whenever this class takes hold the dawn of a new era is upon us and horticulture will take the lead.

In summing up the care of an orchard, bear in mind that by cultivation and irrigation you supply the tree with food. Any system that you may devise to accomplish this is good. Let every move made be a logical one—made for certain results. Four words cover the whole ground—read, study, observe, and work. There is an advantage we have over California, as our crop ripens earlier than theirs. This assures the very best prices. Last year the I. X. L.'s brought $200 per ton f. o. b., and prospects are better this year. The crop ripens in July. The cost of gathering from the tree to the sack is about 1¼ cents per pound.

In conclusion, from practical experience it can be safely asserted that no better opening presents itself to the lover of horticulture than that of almond culture. It is with us no longer a theory, but a fully proven fact. Success in this as well as in other lines has no royal road leading thereto, but a path graded and macadamized by persevering and intelligent study and labor. If by vigilance one man can save his orchard there can be no reason why others should not do so.

HONEY PRODUCTION.

Many years ago some of the early settlers of this fertile valley brought with them when they came here, or had shipped to them soon after, a few colonies of bees. They were men who had kept bees in their old homes, and they thought the conditions here were favorable for beekeeping. At that time there was but little alfalfa growing in the valley, and its value as a honey-producing plant was not fully known and appreciated, but the whole country was covered with a growth of mesquite, which yields honey in large quantities and of the very best quality. These men did well with their bees, and as fast as possible they increased the number of colonies. There was a splendid market, at good prices, for all honey produced, right here at home and in the surrounding mining camps. Other men saw that there was money to be made in the production of honey, so new apiaries were started and increased as fast as possible, and so it has continued until the few colonies brought across the deserts in early days have increased and multiplied until there are now in the valley probably not less than 8,000 colonies of bees.

The mesquite, which originally supplied most of the honey, has been gradually cleared off to make way for the farmer and rancher, until now the yield from that source is very small; but as mesquite has disappeared alfalfa has been sown, and so good a honey-producing plant has it proven to be that it far outranks the disappearing mesquite. When alfalfa is allowed to stand until it gets into full bloom it yields a large amount of honey, but unfortunately for the beekeeper the tendency among ranchers the past few years has been to cut the alfalfa before it gets into good bloom.

Bees get a little honey from wild-desert bloom, fruit bloom, and the blossoms of shrubs and bushes that grow along ditch banks and on the river bottom, but

the amount obtained from these sources is comparatively very small, so that I may say that practically all our surplus honey comes from alfalfa.

As already said, there was at first a good home demand for all honey produced here, but as the number of colonies increased, and with that the production of honey, the time came several years ago when the supply was in excess of the demand, and other markets had to be found. Being so far from the Eastern markets, it was apparent that it would be necessary to ship in carload lots, and in order to do this it was necessary for the honey producers to cooperate, hence the organization of an association of bee men. The first season there were but two carloads, of about 18,000 pounds net of honey in each, shipped.

Considerable trouble was experienced before this was all sold, partly because this kind of honey was not then known in the Eastern markets, and partly because it was not put up in the best shape, owing to our inexperience. At that time most of the extracted honey was put up in empty coal-oil cans which had been cleaned. Some producers did not get their cans thoroughly clean, with the result that the honey was tainted with a coal-oil taste, which naturally did not help in establishing the new market that we were seeking. It was promptly decided by the association that no more honey would be shipped in coal-oil cans, and arrangements were made to supply shippers with new cans at moderate cost by getting them in carload lots. Our honey is all shipped in 5-gallon cans, two cans in a case. The first year 1 car of 1,100 cases was more than enough for the season's crop. Now 4 to 5 carloads of 1,300 to 1,500 cases each are used in a season. This shows the increased production that has taken place. From the first year, when two cars were shipped, the production has gradually increased until in the season of 1896 29 carloads, containing 750,000 pounds of honey, left this valley for the large markets of the East—Chicago, New York, Pittsburg, Baltimore, Boston, etc. In the years of 1897 and 1898 the total product fell some short of the yield of 1896, being about 600,000 pounds each year. The lighter production of these two seasons was caused by the late frosts injuring alfalfa so that the first crop did not bloom, and by the early cutting of alfalfa by the farmers before it was out in bloom.

Although this industry is not very large compared with some others, still it is in many respects an ideal one, considered in the relation of its benefits to the country. It takes a natural product of the country, sends it to an outside market, and brings back the hard cash, which is distributed among quite a considerable number of men, no very large amount to any one, and these men in turn spend nearly all of it right away among our business men. In this way $18,000 to $25,000 are annually distributed here. Thus this industry is helping to turn the "balance of trade" in favor of this valley.

STOCK RAISING.

Of the 250,000 head of cattle shipped and to be shipped out of Arizona this year, Maricopa County furnishes nearly all that are ready for market. Beeves intended for the slaughterhouses of California, Denver, Kansas City, and Chicago have gone out of the valley by the train load, all of them fattened on Maricopa County alfalfa. The business of fattening cattle is one of remuneration to both farmer and stock raiser. The latter brings his herds from the ranges and turns them over to the alfalfa raiser, to receive them again when they are prepared for market.

The raising of hogs is a profitable business for the farmer, the valley being singularly free from the diseases which make hog raising a precarious industry in the East. Alfalfa is the staple food, and in the alfalfa field the hog remains from the beginning of his career as a pig until he is gathered to the slaughterhouse. Some breeders, however, prefer to feed barley for a few weeks before marketing, that grain giving a firmness to the flesh which alfalfa fails to produce. But there is never any difficulty as to variety of feed, since a failure of crops is unknown, and the yield of barley, wheat, and sorghum can be forecasted almost exactly from the time the seed is planted.

Horses do well, and those who are best qualified to judge say that the climate is an ideal one for horse raising. Blooded horses which would be a credit to Kentucky are becoming numerous in Phœnix and the county towns, and many farmers ride into Phœnix behind their fancy steppers.

OSTRICH FARMING.

This unique industry bids fair to become one of leading importance in the Salt River Valley. Experience has proven that the conditions existing here are ideal for the successful breeding and raising of African ostriches.

OSTRICH FARMING, MARICOPA COUNTY.

of pleasure and health seekers, add much to the busy appearance and material resources of the city, while rapid progress has of late been made in the erection of buildings of substantial character, as well as architectural beauty. The streets are wide and level, and Washington street, the principal thoroughfare of the city, is 3 miles in length, lined on either side for many blocks with handsome business establishments.

Large and commodious hotels are among the especial features of the town. The Adams, the Ford, and the Commercial are up-to-date hostelries. The Adams is the finest and best-equipped hotel in the Southwest, and compares favorably with the best hotels of California. Its equipment is thoroughly modern in every way. The Ford is also an exceptionally well-constructed and attractive building, finely arranged for the comfort of visiting tourists. The Commercial, although an older hotel, is popular with the traveling public. Phœnix is very fortunate in possessing such fine hotel facilities.

West of Center street are the avenues, running north and south, which are numbered, First avenue being immediately west of Center street, and on the east are the streets, also numbered, First street being directly east of Center street. The streets are named after the presidents, alternately in the order of their succession, and keeping this in mind the city of Phœnix is not a difficult place to find one's way about in. On the north side of the city lies the principal residence district, which is ornamented by some as handsome residences as can be found in any city in the Southwest; the climate being a most perpetual spring and summer, the growth of trees, shrubs, and flowers is luxuriant during the greater part of the year, and the floral display and abundance of foliage add much to the appearance of the city generally, and the residence district particularly.

The city hall, on Washington street, between First and Second streets, which since the seat of government has been located in Phœnix, is the official home of the governor and the legislature, is a handsome three-story building of brick. It is situated in the center of a plaza, and surrounded by a lawn planted with trees and shrubs, and ornamented directly in front of the main entrance by a fountain, which in a dry and thirsty land is a very agreeable feature; its cool plash is most refreshing to the tired and overheated wayfarer, who gratefully takes advantage of the comfortable seats under protecting shade trees, which have been considerately provided by the city authorities.

The court-house on Washington street, between First and Second avenues, is also a three-story brick structure, and is surrounded by a blue-grass lawn, shade trees, and flowers. The floral section of the court-house plaza is a most attractive spot, especially so during the winter season, and visitors are fully appreciative of the beautiful display.

Phœnix has a first-rate water supply, an efficient system of sewerage, 2 gas plants, 2 foundries, 2 ice factories, 2 steam laundries, 2 steam flouring mills, a soap factory, and a creamery.

The Maricopa and Phœnix and Salt River Valley Railroad (Phœnix short line) connects the city with the Southern Pacific system at Maricopa junction. The depot is on Seventh street, near Harrison.

The Santa Fe, Prescott and Phœnix Railway connects the city with the Santa Fe system at Ashfork. The depot is on South First avenue and Jackson street.

The Phœnix City Railway Company's lines run west on Washington street from Phœnix Park to a point about 1 mile west of the capitol grounds, and north from Washington and First streets to the McDowell Road.

The central station of the Phœnix fire department is on the northeast corner of Jefferson and First streets. The department comprises an engine company, a hook and ladder company, and three hose companies.

The United States Weather Bureau is established in the Wharton Building.

The Mexican settlements in the vicinity of the Catholic church and on the south side of the city have no longer their former prominence, but are sufficiently in evidence to be of great interest to Eastern visitors, who, having traveled so far to escape the monotony of modern ways of living, are naturally more interested in the picturesque remnants of the past than in present improvements and embellishments.

Having described the city, it only remains to state that well-kept driveways extend far into the country and afford the tourist and health seeker every opportunity of enjoying delightful and invigorating outings. There is scarcely a day throughout the season when it is not sufficiently warm and bright to make a trip into the surrounding country very enjoyable. The trees with which the roads are lined on either side afford a grateful shade, and the vast fields of alfalfa, stretching for miles in every direction, are a delightful rest for tired eyes. Altogether, for the health or pleasure seeker and for the overworked man or woman who needs rest, a winter residence in Phœnix is a continual delight, to be ever looked back to

The first experiment of raising ostriches in Arizona was commenced in 1891, when Mr. Josiah Harbert, with a single pair of birds, started breeding them. The experiment was a pronounced success from the start, the birds increasing rapidly in numbers until the flock was sold in the fall of 1898 to the Arizona Ostrich Company, when it numbered 104 birds, 38 being of breeding age, of which number 26 were paired. Mr. Harbert also realized a nice profit from the sale of feathers, barren eggs, and from admission fees paid by people coming to view the birds.

In the fall of 1898 the Arizona Ostrich Company was organized for the purpose of engaging in ostrich raising on a business basis. Forty acres of alfalfa land, about 3 miles north of Phœnix, were prepared for handling the new industry, and the birds taken there and placed in charge of a competent and experienced man in that class of work. Since that time the flock has increased rapidly, 47 chicks having been hatched. This company now has the largest and finest flock of African ostriches in the United States.

The success attained by the company during the past year is certainly proof that ostrich farming in the Salt River Valley offers a profitable and attractive field for the investment of small capital, backed by intelligence and industry. Through the courtesy of the management accurate figures have been obtained, giving the results of the business during the year, and these figures show that the company will realize a net profit of $2,500 for the year, besides the increase in birds. Forty-seven birds have been hatched during the year, which, estimated at $100 each, bring the total profits of the company for the year up to $7,200. The valuation of the young birds is based on the value of their product, and as they will yield 1 pound of feathers each during their first year, worth at present prices about $15, or 15 per cent per annum on $100, it will be seen that that is a low valuation to place on them. The management is confident that next year will show even a greater relative profit.

When we take into consideration the fact that ostriches continue to yield feathers of a uniform quality for a longer time than the average human life, and that they are not subject to any contagious or other known disease, it would seem that an ostrich farm, properly started in this valley, should prove one of the safest forms of investment, and one of the surest dividend-paying enterprises known.

The man in charge of the farm here (Mr. R. J. Icke), who spent 15 years handling ostriches in South Africa, says the birds do just as well in this valley as in Africa, and that the climatic and other conditions surrounding them here seem as well adapted to their requirements as those existing in their native home; and the results thus far obtained would certainly seem to justify the claim, as but one bird has died during the year, and that a young chick, while all the rest of the flock are in perfect health.

After the birds attain the age of 4 weeks there is little danger of their dying from natural causes for many years. Mr. Icke says it is not known positively how long an ostrich will live under normal conditions; but he states there are birds on the South African farms which are believed to have reached or passed the century mark, many of them having been in captivity there over fifty years. He says they are very rarely known to die from natural causes.

A few words regarding the nature and habits of the ostrich and the methods employed in breeding and handling him in captivity may be of general interest in this connection.

Most people have the idea, obtained probably from their old geographies when they were children, that the female ostrich after laying her eggs in a nest scooped out of the desert sands covers them up with the sand and leaves them, trusting to the heat of the sun to hatch them. This is not the fact. The birds always pair off during the breeding season, the male bird making the nest by resting his breastbone on the sand and turning slowly round and round, scratching the sand away with his feet until a shallow hole is made, some 3 feet in diameter and about a foot deep. The female then lays, usually, 15 eggs, and the birds take turns setting on them, the female setting during the daytime and the male at night, except that the male allows the female about an hour in the middle of the day to feed, when he takes her place on the nest. As a female bird will lay three settings of eggs (or about 45) before she stops, about 30 are taken from her and hatched in the incubator, the birds being permitted to hatch the last 15 eggs laid. The eggs hatch in about forty-two days, the old birds helping the chicks to get out of the shell.

A chick 1 week old weighs about 5 pounds, at 6 weeks 50 pounds, and at maturity about 300 pounds. The chicks grow very rapidly, reaching a height of about 5 feet at 4 months of age. At 4 years, when full grown, they average nearly 8 feet in height.

The first few days after hatching the chicks must be carefully watched and cared for to keep them alive; when 4 weeks old they are considered safe, and require but little special care after that age. The young birds are fed a little grain, but the old birds obtain their entire living from the alfalfa on which they graze. During the breeding season each pair of birds is placed in a separate field about 50 by 200 feet in size; the other birds are turned into large pastures together. One acre of alfalfa will furnish feed for 4 full-grown birds throughout the year. They require but little water, and their keeper does not have to worry for fear he may miss a "run" of water and his birds have to go without any for a couple of weeks. Last winter these birds were given no water rom September to April, yet they seemed just as well pleased; and Mr. Icke informed the writer that he had known birds to go three years in Southern Africa without a drop of water, and apparently without any ill effects.

The birds require but little care, one man being able to do all the work connected with the farm and its 150 ostriches, with the assistance of an additional man who is employed by the day occasionally, when picking or other extra work is necessary.

The birds are first plucked when 6 months old, yielding about 12 ounces of feathers each, of the market value of $7.50 per pound. After that they are plucked every eight months, yielding an average of 1 pound of feathers each plucking, of the value of $17.50 per pound at present prices. How long the birds will continue to yield feathers is not definitely known, although in South Africa they have been yielding feathers continuously for fifty years, with no signs of decreasing.

There are now 5 ostrich farms in the United States—2 in California, 1 in Texas, 1 in Florida, and 1 in Arizona. The fact that the farm here, although the youngest, is the largest and most flourishing in the country, proves conclusively that the Salt River Valley is better adapted to the successful breeding and handling of the African ostrich than any other section of the continent. No protection whatever is required here for them during the winter. They graze the entire year in the fields the same as horses and cattle, and are always healthy and thrifty.

During the last fiscal year $1,700,000 worth of ostrich feathers were imported into the United States from Africa, and only about $120,000 worth produced in this country, so there is little to be feared in the line of competition from overproduction at home. As the Government imposes a duty of 15 per cent ad valorem on imported feathers, the American farmer is amply protected from foreign competition,

The local farm is a very interesting and instructive place for tourists to visit, and hundreds of people avail themselves of the opportunity afforded them, when in this portion of the country, to behold the king of birds in his natural state, where he has the freedom and surroundings to properly show off his magnificent proportions and his wonderful powers of speed and endurance, and he shines forth in all the majesty and beauty of his native land. A small admission fee is charged, and as the farm is situated only 3 miles from Phœnix, on one of the finest drives in the country, there is a constant stream of people going to and from the place in the winter. The eggs that have proven barren (generally about 10 per cent of those laid) are also sold as souvenirs, and from tnese two sources alone the company derives sufficient revenue to pay all expenses of maintenance and operating the farm, leaving the increase in birds and the receipts from the sale of feathers practically clear profit.

The men interested in this industry here, who have carefully studied the subject, assert as their positive belief that when it becomes generally known that this valley is an ideal place for successfully breeding and handling ostriches, and when the safety and profitableness of this form of investment is fully appreciated, the Salt River Valley will become as important an ostrich-raising country as South Africa is to-day; and in view of the wonderful success attending the work thus far attempted, there would seem to be good grounds to expect this prophecy to be speedily fulfilled.

THE CITY OF PHŒNIX.

It has been said that Western towns are either miniature cities or exaggerated villages. Her residents consider Phœnix included in the former class. She is essentially modern, founded though she be on the ruins of a pre-Columbian civilization. Here there is none of the languor of the South, no trace of the provincialism of the Middle West, and only enough of the Mexican and Indian to make picturesque the poorer quarters of the city. Hither have come the brightest of minds, professional and commercial, and the visitor soon acknowledges that here he finds push and intelligence not inferior to those qualities that mark the most favored communities of the Union.

SCENE NEAR PHŒNIX.

RESIDENCE STREET, PHŒNIX.

The inception of the city is within the memory of many of its present residents. It was in 1868 that a small number of pioneers banded together to form its nucleus. In 1870 it was platted. Among the original American residents were W. A. Hancock, John T. Dennis, Ben Block, Thomas Barnum, Jacob Starer, E. Irvine, C. H. Gray, J. D. Monnihon, and J. P. Osborne.

The valley had been occupied for several years, since Jack Swilling, noted for desperate deeds, had come from the Rich Hill diggings to cut a ditch from Salt River and to practice the arts of peace. Friendly Indians were to the south and wild Apaches on the north and east. John T. Dennis, who then lived near the present waterworks site, in the late sixties lost a number of cattle and horses through a raid of the Yavapai Apaches, and only proximity to the friendly Pima and Maricopa tribes saved the infant settlement from continued depredations. In 1871 a traveler wrote that Mrs. J. J. Gardiner was the only American woman in the village, there being at the time about 75 American men. In 1877 Hinton wrote that Phœnix was a town of about 500, half the population being Mexican.

September 5, 1872, the first public school was started. It was a long adobe building on what is now First avenue, about 50 feet south of Washington street, the same edifice serving as court-house. A few years later a little adobe one-roomed building was erected on what is known as the Central school block, on North Center street.

In 1871 the county was established, carved from the southern portion of the giant county of Yavapai. The first county record filed was a deed in which was transferred the ownership of the ground on which the Porter Block now stands. The price was $100. The present value of the same ground is about $20,000. In the spring of 1879 the Southern Pacific, building eastward, reached Maricopa, and through Phœnix flowed the entire commerce of northern and central Arizona, then rejoicing in the greatest degree of mining activity ever known to the region. Dusty freight teams, not infrequently with 20 mules to a team, were almost continuous on the road from the railroad north, bearing supplies to the mines. The freighter was the most important of beings, and lived in a freighter's gastronomical paradise on a diet of canned goods straight. Fast freight to Prescott had a tariff of 4 cents a pound, and fast freight meant making the 170 miles in two weeks. There was a strong Mexican flavor to the community, and a knowledge of Spanish was almost essential.

Occasionally on the streets would be seen numbers of squeaking 2-wheeled ox carts laden with fruit, mescal, and other products of Sonora, brought across the international line in serene carelessness of any such thing as tariff.

Phœnix has not been exempt from the usual "wild west" experience of a border town. In its earlier days there were occasional chases after Indians in the northern or eastern hills. There is a tale of how a posse of citizens ran down a band of horse thieves at the junction of the Gila and Salt and buried them, Attila like, in the sands of the river bed. It is remembered that three "rustlers" were found hanging one morning from trees in the northeastern part of the village. Then there was the Mexican who was lynched on the crossbeam of Jim Monnihon's corral gate, and the killing of the fellow who shot Lew Bailey through the window at a dance in the old adobe back of Goldman's corner. There are many who remember how Marshal Enrique Garfias gathered in the cowboys who last attempted to shoot up Main street, after emptying two cowboy saddles by good equestrian pistol work.

In 1879 the town was at its roughest. In August of that year it reformed. In the mass of miscellaneous crime there have been 2 stage robberies and 7 killings in a single week. Then the vigilantes came out, composed of about 100 of the best citizens. They took 2 prisoners from Jailor McDonald and hanged them to cottonwood trees on the Washington street side of the plaza. The fellows hanged were McCloskey and Keller, murderers, respectively, of John Le Barr and Luke Monihon. That good job accomplished, the vigilantes assisted Sheriff Thomas in clearing the community of desperadoes and all who had no visible means of support.

July 4, 1887, the Maricopa and Phœnix Railway materialized, giving steam connection with the world, and Phœnix became a city. In 1889 she took a further step in becoming the Territorial capital. March 12, 1895, she assumed the place of southwestern center and metropolis, upon the completion of the Santa Fe, Prescott and Phœnix Railway, through which she not only secured competitive freight rates, but was given outlet for her products to the northern part of the Territory.

The Phœnix of to-day, the county seat of Maricopa County, and capital of the Territory, has 15,000 inhabitants, and its people are an enterprising and progressive body of citizens. The large transient population, principally composed

of pleasure and health seekers, add much to the busy appearance and material resources of the city, while rapid progress has of late been made in the erection of buildings of substantial character, as well as architectural beauty. The streets are wide and level, and Washington street, the principal thoroughfare of the city, is 3 miles in length, lined on either side for many blocks with handsome business establishments.

Large and commodious hotels are among the especial features of the town. The Adams, the Ford, and the Commercial are up-to-date hostelries. The Adams is the finest and best-equipped hotel in the Southwest, and compares favorably with the best hotels of California. Its equipment is thoroughly modern in every way. The Ford is also an exceptionally well-constructed and attractive building, finely arranged for the comfort of visiting tourists. The Commercial, although an older hotel, is popular with the traveling public. Phœnix is very fortunate in possessing such fine hotel facilities.

West of Center street are the avenues, running north and south, which are numbered, First avenue being immediately west of Center street, and on the east are the streets, also numbered, First street being directly east of Center street. The streets are named after the presidents, alternately in the order of their succession, and keeping this in mind the city of Phœnix is not a difficult place to find one's way about in. On the north side of the city lies the principal residence district, which is ornamented by some as handsome residences as can be found in any city in the Southwest; the climate being a most perpetual spring and summer, the growth of trees, shrubs, and flowers is luxuriant during the greater part of the year, and the floral display and abundance of foliage add much to the appearance of the city generally, and the residence district particularly.

The city hall, on Washington street, between First and Second streets, which since the seat of government has been located in Phœnix, is the official home of the governor and the legislature, is a handsome three-story building of brick. It is situated in the center of a plaza, and surrounded by a lawn planted with trees and shrubs, and ornamented directly in front of the main entrance by a fountain, which in a dry and thirsty land is a very agreeable feature; its cool plash is most refreshing to the tired and overheated wayfarer, who gratefully takes advantage of the comfortable seats under protecting shade trees, which have been considerately provided by the city authorities.

The court-house on Washington street, between First and Second avenues, is also a three-story brick structure, and is surrounded by a blue-grass lawn, shade trees, and flowers. The floral section of the court-house plaza is a most attractive spot, especially so during the winter season, and visitors are fully appreciative of the beautiful display.

Phœnix has a first-rate water supply, an efficient system of sewerage, 2 gas plants, 2 foundries, 2 ice factories, 2 steam laundries, 2 steam flouring mills, a soap factory, and a creamery.

The Maricopa and Phœnix and Salt River Valley Railroad (Phœnix short line) connects the city with the Southern Pacific system at Maricopa junction. The depot is on Seventh street, near Harrison.

The Santa Fe, Prescott and Phœnix Railway connects the city with the Santa Fe system at Ashfork. The depot is on South First avenue and Jackson street.

The Phœnix City Railway Company's lines run west on Washington street from Phœnix Park to a point about 1 mile west of the capitol grounds, and north from Washington and First streets to the McDowell Road.

The central station of the Phœnix fire department is on the northeast corner of Jefferson and First streets. The department comprises an engine company, a hook and ladder company, and three hose companies.

The United States Weather Bureau is established in the Wharton Building.

The Mexican settlements in the vicinity of the Catholic church and on the south side of the city have no longer their former prominence, but are sufficiently in evidence to be of great interest to Eastern visitors, who, having traveled so far to escape the monotony of modern ways of living, are naturally more interested in the picturesque remnants of the past than in present improvements and embellishments.

Having described the city, it only remains to state that well-kept driveways extend far into the country and afford the tourist and health seeker every opportunity of enjoying delightful and invigorating outings. There is scarcely a day throughout the season when it is not sufficiently warm and bright to make a trip into the surrounding country very enjoyable. The trees with which the roads are lined on either side afford a grateful shade, and the vast fields of alfalfa, stretching for miles in every direction, are a delightful rest for tired eyes. Altogether, for the health or pleasure seeker and for the overworked man or woman who needs rest, a winter residence in Phœnix is a continual delight, to be ever looked back to

HOTEL ADAMS, PHŒNIX.

FORD HOTEL.

with fond remembrance, and especially when winter lays its icy hands upon them in their Eastern homes. But a good many such visitors, unable to resist the seductions of this climate, have remained here and become permanent residents of the Territory.

For several years Phœnix has been attracting more and more attention from people in search of an equable climate, and it is now generally understood that such conditions as are most desired are to be found here. It is not only people in ill health who seek our genial climate, but many sojourn here during the fall, winter, and spring for the pleasure incident to an unrestricted out-of-door life.

It is this class of people who have made southern California what it now is.

Phœnix now derives not less than $2,000,000 a year from people who are attracted by our climatic conditions. This source alone will, in the course of time, give us a population many times greater than we have at present. Florida and the erstwhile popular winter resorts of the South can not compare with beautiful and healthy Phœnix.

PHŒNIX CLIMATE.

The climatological data for Phœnix for the year ending 1898, just issued from the weather bureau, contains some very interesting information about the wonderful climate of Phœnix and the Salt River Valley. It shows that the mean temperature for the year was 70°. The mean for the winter months of January, February, and December was 47°, 59°, and 49°, respectively. The coldest temperature recorded for these months was 23°, 36°, and 28°, not cold as compared with the East. The relative humidity for the same months was 56, 41, and 51 points respectively. For the spring months of March, April, and May the mean temperature was 57°, 72°, and 73°.

The hot summer months of which Eastern visitors hear so much—July, August, and September—show a mean temperature of 92°, 90°, and 84°, respectively, but the relative humidity for these months was only 37°, 44°, and 32°. The maximum temperature recorded on any date in these months was 111°, 109°, and 106°. But this temperature is that registered by the dry-bulb thermometer. While to the Easterner it seems enormously high, it is not as severe or oppressive a heat as is experienced every summer in New York, Chicago, and Cincinnati, Washington, and other Eastern cities. As an illustration may be cited one of the hottest days of last July, when the dry-bulb thermometer registered 102° at 8 o'clock at night. The wet bulb showed at the same hour but 72°, it registering the appreciable heat as one would experience a hot, stifling night in the East, and 72° there is not considered bad.

In all the year there was not a day when the mean temperature for the day fell below 32°, and but 11 days when it fell below 41°. On 319 days the mean temperature was above 50°, and on 249 above 59°.

The total rainfall for the year was 5.95 inches, of which 1.63 inches fell in January, 0.18 inch in April, 0.08 in June, 0.24 in July, 1.03 in August, 1.01 in November, and 1.70 in December, the remaining 0.08 falling in March, May, and September.

But it is in the amount of its sunshine that Phœnix and Arizona particularly excel, and it is a fact that there is not another habitable spot on the globe that shows such constant sunshine. Of the 365 days of the year there are but 35 set down as cloudy, and 71 as partly cloudy, giving 259 absolutely clear days. The percentage of possible sunshine for the months of December and January—the months of most cloudy days—was 62 and 73, while for the months of February, March, April, and May the percentage of sunshine was 88, 82, 86, and 90, respectively, and for the fall months of October and November 95 and 92 per cent. For the month of September the percentage of sunshine reached the high figure of 98, there being but one partly cloudy day in the month. The director of the weather bureau states that for periods of ten days to two weeks at a time here there will not appear a single cloud in the sky during the entire day, not even the cloud "no bigger than a man's hand." Such a climate affords the ideal place for invalids and health seekers. Nor are high winds encountered here. The average hourly velocity for the year was but 4.3 miles, and the highest for any month was 4.9 miles in March and April, and the lowest 3.3 miles for the month of February.

It will be remembered that February, 1899, was an exceptionally cold month in all parts of the country east of the Rocky Mountains. The minimum records were broken at nearly every weather bureau between the 11th and 14th during the progress of the severe cold wave of that period, and many of the minimum temperatures occurring on these dates were from 10° to 26° below any previously recorded. It is difficult of belief that during this exceptionally cold period in the

East the temperature in Phœnix was slightly above the normal. The actual figures for the period under notice are:

1898.	Maximum.	Minimum.	Mean.
February 11	72	41	56
February 12	69	40	54
February 13	68	43	56
February 14	70	38	54

CAPITOL BUILDING AND GROUNDS.

The plans for the new capitol, the construction of which has made rapid progress during the present year, call for a structure four stories in height and 184 by 84 feet in size. The first story is to be of granite from the granite quarries near Phœnix, and the superstructure of tufa stone from Kirkland, Skull Valley. The style of architecture is classic, but not severely so, and the building on completion will present a handsome and imposing appearance.

The rotunda is 44 feet in diameter, and extends from the ground floor through all the stories of the building to a height of 78 feet, being surmounted by a dome, which is crowned by a statue of Liberty 16 feet in height.

The dimensions of the halls provided for the legislative bodies are 38 by 36 feet, and special attention has been given to the acoustic properties of these halls and their efficient ventilation. The gallery space in each hall has a seating capacity of between 200 and 300, and surrounding the halls will be the committee and other rooms required for the accommodation of the legislators.

Special offices are also provided for the governor and other Territorial and Federal officials.

The capitol grounds, 10 acres in extent, were donated to the city some ten years ago, and were laid out at the expense of the Territory nine years ago.

The design on the east side of the grounds is geometrical in style. The lawns on the west half of the grounds have not yet been completed.

The principal deciduous trees with which the capitol site is ornamented are the Arizona ash, the Russian mulberry, the umbrella, the Mexican chinos, the eucalyptus, and a few elms.

Among the palms are the California fan and date palms, the blue and Japanese fans, and a large variety of yuccas. The shrubs comprise specimens of Australian, Chinese, Japanese, European, and native varieties, and there is a nice collection of cacti and a fair one of roses.

When the work in contemplation has been carried out the capitol grounds will form an admirable setting for the new building.

THE TOWN OF MESA.

Twenty-two years ago a caravan of Mormon people from Utah settled on the land which is now covered by the lively little town of Mesa. The name was derived from the topography of the country, the Spanish word mesa meaning table. The country surrounding Mesa is high, flat, and nearly level. The town is 8 miles east of Tempe, and 17 miles east of Phœnix. It is 100 feet higher than Tempe and 180 feet higher than Phœnix. The Maricopa and Phœnix and Salt River Valley Railroad enters the place and runs two trains to Phœnix daily. The town is situated in the center of a thickly settled country of small farms, on the outskirts of which district are large grain and cattle ranches. The mesa country is thrusting itself forward as a fruit section. There are more large and small orchards, vineyards, and nut groves on the mesa than anywhere else in the Territory. The Mormon is a small farmer and the highest state of cultivation is reached under his care, as can be readily seen by a passing visitor. The soil on the mesa can not be surpassed, and the water supply is second only to Tempe, while the canal system is nearly perfect.

The town of Mesa is 1 mile square. The blocks are twice the size of the ordinary block, and the streets are as wide as boulevards. There are many beautiful residences and grounds, and the business blocks are for the most part substantial bricks.

The hotel accommodations are ample and first-class; the water pure and the atmosphere healthy, and the people and conditions make the city an ideal place for a home. The place is thoroughly lighted by electricity.

There are 900 progressive, energetic people in the city.

COMMERCIAL HOTEL AND CENTER STREET. LOOKING NORTH.

It was in October, 1863, that Mr. Wickenburg, accompanied by Theodore Green Rusk, afterwards known in Tucson as Verde Green, and Major VannBibber, left Peoples Valley in search of a rich gold ledge which Capt. King Woolsey had described as being located on the south side of the Harquahala Mountains, and of which he exhibited specimens of great value. Coming down along the Hassayampa River Mr. Wickenburg and party camped near the river, on the site of the present town, in what was then called Pumpkin Patch by the Indians, as they had been raising pumpkins there and the vines strewed the ground. In hunting for Captain Woolsey's tracks Mr. Wickenburg discovered some rich gold ore about 14 miles west of the river, and as he thought it was rich enough for him he gave up the search and located what has ever since been known as the Vulture mine. The big, black ledge, standing up so prominently before him, induced Mr. Wickenburg to call it the Vulture, and paradoxically it became the prey of unscrupulous men not many years after. In the face of torture and death from the then bloodthirsty savages, Mr. Wickenburg worked alone and as best as he could this great discovery, until in the spring of 1864 he built arrastres and worked some of the richest ore in Wickenburg, getting in bullion some $25,000 to $30,000.

In 1865 Captain Tyson built a 5-stamp mill at Wickenburg, under contract with Mr. Wickenburg to give him 50 per cent of the bullion obtained from the ore furnished by the latter, but as the Captain failed to make returns, his supply of ore was cut off, and the mill fell into Mr. Wickenburg's hands. It was about this time that a sale was negotiated by Mr. Wickenburg of 300 feet of his original discovery ledge of the Vulture to Bechtuel Phelps for $25,000, of which sum $20,000 was paid, when a dispute arose, necessitating the expenditure of this amount in unsuccessful litigation to obtain Mr. Wickenburg's rights. The company formed at that time built a 40-stamp mill in 1866, which was located about where the Phœnix Extraction Company's cyanide works are now. In fact, these works are now, and have been for years, cyaniding the immense quantity of rich tailings left after the operation of this 40-stamp mill for ten years. During this time, from 1866 to 1876, it was estimated that some $15,000,000 in gold bullion that was accounted for was taken out of the Vulture mine, and it is claimed that as much more was taken out that was not known of or accounted for. Through the manipulation of its officers the company got into difficulties, incurred a debt of $400,000, and the property was sold to satisfy creditors, after having produced a colossal fortune.

Thus the old mine that was the means of starting this town went from one hand to another, till it is now being operated in a very small way, though still one of the largest and richest prospects in the country. While Wickenburg was named after the discoverer, the now venerable Uncle Henry Wickenburg, it was not named by him, but by James A. Moore, who was stopping with Uncle Henry at his ranch in 1864, and who, in correspondence with Territorial Governor Goodin and Secretary McCormick, dated his letters first Wickenburg Ranch, and later Wickenburg, thus giving it its present name. It was in the winter of 1868 and 1869 that Jack Swilling promoted his irrigation scheme, and Henry Wickenburg took a gang of men with a mule team to what is now the city of Phœnix, and dug the first ditch in the valley, known as the Swilling or Town Ditch.

The original town site of Wickenburg was platted by Robert Groom, known as Uncle Bob, in 1868, but not having been filed, it was replatted and filed some years later. Before the Walnut Grove dam burst and washed out all the bottom land along the river there were few finer ranches in the Territory than the Brill and Wickenburg ranches. In 1894 the Santa Fe, Prescott and Phœnix Railway was built through here, and with its construction and the facilities it afforded for the development of the country, witnessed the return of the mining activity that has continued with unabated vigor since. It is now one of the most promising and growing towns in the whole Territory. Surrounded as it is by some of the richest mining districts of the southwest, and with an abundant supply of good water, excellent railroad facilities, a fine, equable climate the year round—being at an elevation of 2,150 feet—it bids fair to be, as one optimistic New Yorker calls it, "The Cripple Creek of Arizona." There are several very rich properties being worked both to the east and west of the town proper, and the flourishing condition of the townspeople and merchants indicate that its growth is rapid and sure.

Glendale, Peoria, Alhambra, Agua Caliente, Gila Bend, and Maricopa are prosperous villages.

ASYLUM FOR THE INSANE.

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Situated as it is, at the upper end of the Salt River Valley, Mesa will always be the gateway for everything going to and from the great mining regions north and east of Mesa. Lack of transportation facilities prevent the rapid growth of the mesa district as a produce and fruit center, but with the advent of the Globe wagon road, now in course of construction, this will be nearly overcome. The building of this has stimulated a general move among the fruit and truck men to greatly increase their shipments this year.

THE TOWN OF TEMPE.

Situated on the south bank of the Salt River, and nestling behind a towering butte 9 miles east of Phœnix, is the pretty little city of Tempe. The spot which it covers inspired "Darald Dipper," the son of an English earl, thirty-one years ago to name it Tempe, because it so vividly brought to his mind the Vale of Tempe in Greece, which he had visited in his travels. The people of the place have caught the spirit in which it was named, and every year sees the place a little prettier than the preceding one.

The town is one of the principal shipping points of the Territory, as it is the outlet to the whole south side of the Salt River Valley. The Maricopa and Phœnix and the Phœnix and Mesa short line railways pass through the place. Six trains run through the town daily and give it better train service than is enjoyed by any other city in the Territory with the exception of Phœnix. It is likely that Tempe will become one of the greatest railroad centers in Arizona, because of its situation at the only practical railroad crossing of the Salt River in the valley. All roads that will go through the valley will undoubtedly cross at Tempe. This natural advantage is a very significant one, and as the valley develops will be fully realized.

The country surrounding Tempe and contributory to it is the wealthiest and the most developed in the valley. This is due to the Tempe Canal. The Tempe Canal is the oldest but one in the valley, and the largest but two. It is entitled to and receives more water than any other canal, and consequently the land under it supports a wealthy community. The town quickly feels the prosperity of the surrounding country, and this year an unusual amount of building is going on. Seven new houses and stores have been finished this season and extensive improvements made on a half dozen others. Two handsome residences and one two-story business block were completed during the month of March. There are in course of construction two large and beautiful churches, two elegant homes, and one three-story brick and business block. One mile of grading and graveling of the streets has been done this spring, which gives Tempe the best streets of any city or town in the Territory. An electric light system has been nearly established and is in operation. There are no city waterworks, but the people are agitating the question so earnestly that the near future will undoubtedly find this all-important factor to a city's growth in full working order. Neither is there a first-class hotel to accommodate the public, but this, too, is assured, and will be provided in the near future.

Besides these things of the present, Tempe has its projects and dreams, as does every other energetic and growing little city.

The population of Tempe is 2,000, and is increasing at a healthy rate.

THE TOWN OF WICKENBURG (MINING).

Although Maricopa County is preeminently an agricultural region, the mining industry is not a small one. Phœnix, of course, is an important center for mining transactions, covering all portions of the Territory. In the capital city mine owners and prospectors congregate in large numbers to spend the winter months, and few capitalists seeking mining investments in the Territory fail to come to Phœnix. Here they find a common news center, and buyers and sellers naturally gravitate to Phœnix.

But in actual mining the county is making a good record. Activity continues in all the mining camps, particularly at Goldfield, Castle Creek, the Harquahala Mountains, and around Wickenburg, and no review of the general conditions and progress of the county would be complete without a notice of its most important mining camp—Wickenburg.

This famous old town is the third oldest in the Territory, Tucson being first and Yuma second. The original location was made by Henry Wickenburg, who was the second white man to explore this section, and the first and only one who had courage enough to stay here any length of time, braving death at the hands of the murderous Apaches.

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PRESCOTT.

INDIAN SCHOOL.

The most important Indian school in the United States is located 3 miles north of Phœnix, at the end of a beautiful drive from the city. Several hundred pupils are receiving an education which will fit them for civilized life. The institution is under good management, with an able corps of teachers.

CHURCHES.

The following denominations have active organizations in this county, and some of these have church edifices that would attract attention and favorable comment in much older communities: Methodist Episcopal, 6; Methodist Episcopal South, 8; Baptist, 4; Episcopal, 2; Presbyterian, 2; Congregational, 1; Christian, 1; Dunkard, 1; Catholic, 3; Mormon, 3; Salvation Army, 1.

FRATERNAL SOCIETIES.

There are in the county: Masonic lodges, 3; Odd Fellows, 3; Foresters, 1; Knights of Pythias, 1; Ancient Order of United Workmen, 2; Woodmen of the World, 4; Grand Army of the Republic, 1; Confederate Veterans, 1; Benevolent and Protective Order of Elks, 1; Independent Order of Red Men, 2.

PREHISTORIC RELICS AND RUINS.

Maricopa is rich in prehistoric relics. Ruins of ancient cities, towns, and temples can be traced in many parts of the valley. Lieutenant Cushing, of the Hemmingway Archæological Expedition, informed the writer hereof that he had traced the foundation of a city south of Tempe a distance of nearly 6 miles. He also expressed the opinion, from investigation, that what is now Maricopa County at one time contained a population many times greater than the entire population of the Territory. Many remains of irrigation works are to be found, and some of them have been utilized by modern engineers.

Assessed valuation of property in Maricopa County.

Land (251,729 acres)	$3,322,967.00
Improvements	506,673.00
Patented mines (14)	7,300.00
City and town lots	2,464,002.00
Improvements	1,205,214.00
Horses:	
Range (1,962)	19,620.00
Work (2,529)	75,870.00
Stallions (7)	5,550.00
Mules (222)	5,550.00
Jacks (3)	160.00
Asses (42)	210.00
Cattle:	
Range (18,537)	185,370.00
Beef (762)	15,240.00
Milch cows (3,354)	83,850.00
Bulls (147)	4,410.00
Sheep (7,006)	14,012.00
Goats (1,305)	2,610.00
Swine (4,369)	10,922.50
Railroad, standard gauge (97.09 miles)	563,513.91
All other property	824,438.09
Total	9,812,482.50

YAVAPAI COUNTY.

County seat, Prescott.

County officers.—Supervisors, George H. Schuerman, J. R. Beatson, D E. Dumas; district attorney, Reese M. Ling; probate judge, C. P. Hicks; school superintendent, C. F. Cox; assessor, Joseph P. Dillon; sheriff, John L. Munds; treasurer, Dennis A. Burke; recorder, W. I. Johnson; clerk board of supervisors, John H. Robinson.

From the first settlement of the Territory no section has been more favored or sought after than Yavapai County. Its natural advantages have attracted capital, and enterprise has been conspicuous in developing the county.

Richer in a great variety of resources than any other portion of the Territory, possessing a climate free from the extremes of heat and cold, it was but natural that the first north and south railroad possessed by the Territory should be built for the purpose of developing the resources of this favored region.

The completion of this road, named the Santa Fe, Prescott and Phœnix Railway, removed forever the only obstacle that has ever delayed the development of this diversified and extensive section, by placing it in direct railroad communication with the great centers of the nation; and to the homeseeker, capitalist, or tourist no other portion of the Union can present more varied and numerous attractions.

No other portion of the Southwest has secured so large and so desirable an increase in its population during the last few years as has this county. While there are isolated instances of a few sections having, under the excitement of a "boom," attracted, for the time being, more attention, the growth of this portion of Arizona has been a steady one, permanent and stable in its character, and entirely free from the feverish intoxication of speculation, which so often forms the only basis on which new regions of the West are brought into prominence, to be maintained there until the schemes of unscrupulous speculators are consummated, and then allowed by their "boomers" to relapse into their former obscurity. To present, in writing, a satisfactory idea of any frontier settlement is a most difficult matter. The causes that have called such settlement into existence may be narrated, and its growth may be explicitly set forth with conscientious observance of statistical minutiæ; yet the impression created may be far from being more than approximately correct. Within less than a quarter of a century more people have found homes within a radius of a hundred miles of Prescott, Ariz., than lived along the entire Atlantic coast of North America during the first half of the century following the landing of the Pilgrim Fathers.

POPULATION.

The population of Yavapai County is about 25,000, and so evenly distributed that wherever one goes he will find within easy distance every element of civilization.

The towns and settlements are bustling and progressive, among which are Prescott, the county seat and the first capital of Arizona, with a population of 3,500; Jerome, a distinctively mining camp, with over 3,000 souls; Congress, with 1,000; Crowned King, with 500; McCabe, 300; Ash Fork, with 500; Congress Junction, with 200; Mayer, with 200; and many other places with from 100 to lesser numbers. In addition to the above numerous "camps" make up in their numbers thousands of souls scattered here to-day and everywhere to-morrow.

EDUCATIONAL.

The educational facilities presented by Yavapai County are excellent and far surpass even older settlements. For instance, at the present time over 50 school districts are maintained in the county, with an aggregate attendance of over 1,600 pupils, and calling for an annual expenditure of over $43,000 to sustain them.

CLIMATE.

The most attractive feature of Yavapai is its climate—language can not do it justice. The extremes of heat and cold are rarely felt here, as the meteorological report of the signal service at Fort Whipple for a period of ten years proves:

	Degrees.
San Diego	61
Los Angeles	61
Santa Barbara	60
Monterey	57
Prescott	58
San Jose	57
Oakland	55

The altitude of Prescott is 5,500 feet above sea level, and the atmosphere accordingly dry and bracing.

RAINFALL.

A large part of the water that serves to reclaim the lands of the Salt River Valley comes direct from central Arizona, and if it were not for the large rainfall of this region there would be little civilization where the rich and prosperous settlements north of the Gila and in its near neighborhood now exist. Phœnix and Tempe, with their thousands of acres reclaimed from the desert, are largely dependent upon this section for water, and the land which is now selling there for hundreds of dollars an acre owes its reclamation to northern Arizona. The average annual rainfall of the vicinity of Prescott during ten years is shown by the records of the United States observers to be 15.18 inches.

The following tabulated statement is reproduced and is taken from the United States Signal Service station at Fort Whipple, and covers a period of ten consecutive years.

Annual rainfall.

	Inches.
San Diego	11.01
Anaheim	11.01
Riverside	9.37
Colton	9.84
Spadra	12.39
Los Angeles	17.64
Monterey	14.96
Visalia	9.39
Fresno	9.57
San José	12.95
Prescott, Ariz	15.18

As will be seen by inspection of all the noted localities mentioned, Los Angeles is the only one possessing a greater annual rainfall than Prescott, yet among the places named are the most prominent orange and grape growing regions of the Golden State.

If the invalid is in search of pure and invigorating air, it is here he will find it. If the army of consumptives who "have gone before" in southern California and Florida had wandered to this Mecca, life would not have been a burden under these clear, cool skies. The terrible cold of the North or the withering heat of the tropical South is here unknown.

Reports from the Medical Department of the United States Army, embracing the zone of which Fort Whipple (but 1 mile from Prescott) is the center, give the remarkable statement that that military post is one of the healthiest regions of the world.

AGRICULTURE AND KINDRED PURSUITS.

With the possible exception of the Verde Valley, very little land has, up to the present time, been strictly devoted to agriculture. In the above locality, however, embracing a cultivated area of 3 miles wide by 45 miles in length, there is to be seen one of the most prosperous and progressive farming communities in the Southwest. It is well watered throughout the entire year, and, by means of canals recently constructed, a considerable area has been reclaimed in the past few years. The demand for its products is greater than its supply—a fact which is proven in the price paid for hay, grain, fruits, and farm produce, each of the above commodities ranging in price in near-by markets from 25 per cent to as high as 50 per cent over that shipped in from outside points.

In the county there are about 40 miles of irrigating canals and laterals. There are many water courses in the county upon which men of capital or corporations can erect dams for the conservation of water, so that an area aggregating 200,000 additional acres can be put under irrigation at a minimum cost.

The ranges for cattle, horses, and sheep are almost unoccupied, owing primarily to the fact that the land suitable for that purpose has been either overcrowded or eaten out. Last year it is estimated that over 100,000 head of steers were shipped or driven out of the county to pasture fields, which will have a tendency to renew interest in this calling in future years.

Very little land is devoted to horticulture, although the climatic conditions are such that an unequalled quality of fruit of certain kinds can be raised. The lack of water in the best localities is the main drawback. Peaches, apples, pears, cherries, and all kinds of berries do well, and are superior to those raised in the valley counties; grapes also mature well and are of exceptionally good quality. Fruits mature from July to September. There is a good field for the orchardist.

here, as the demand is large and fruit of all kinds keeps well. The only enterprises of any importance in this line are those of Ross & Clay and Haskell & Kirwagen. The former have 4,000 trees about ready to bear and the latter some 1,500 bearing.

The consumption of butter, eggs, and cheese is fifty times greater than the supply, necessitating the shipment of these products from the Salt River Valley and Kansas.

LUMBERING.

One of the prominent features that first impresses the stranger in Yavapai County is the vast and seemingly inexhaustible supply of timber suitable for all branches of the lumber business. The appearance presented by these primeval forests, after the long days spent by the traveler in journeying through the monotonous expanses of Eastern prairies, or the still less interesting wastes of California deserts, is a most pleasing one, and the beauties of the forest scenes presented grow with acquaintance. The principal timber is the pine, there being not less than three distinct varieties. The piñon, ash, elder, cedar, cottonwood, oak, walnut, and quaking asp are also found in abundance. The property values show an increase of over a quarter of a million dollars over the previous year, and had not the city of Jerome been nearly wiped out by conflagration the total valuation would unquestionably have reached the six million dollar mark.

POINTS OF INTEREST.

There are many houses of the cliff dwellers situated not far from Prescott, and many historic ruins. The Castle Creek Hot Springs will soon become famous as a health resort, the waters being considered superior to most of the famous hot springs of the country. It is claimed and well authenticated that these springs will cure the most obstinate cases of rheumatism, stomach disorders, or scrofulous diseases of any character or origin, no matter of how long standing. The accommodations are excellent and the comforts and care of a home are ever ready. Convalescents from typhoid fever readily attest to the merits of its curative waters, while the emaciated victims of years of suffering from the "grip" seem to find here the only help possible in the restoration of health and vigor. The writer has personally talked with several people afflicted with the latter disease who have visited these springs, and each and all cheerfully and voluntarily attest to the curative effects of the water.

BUILDING STONE, ETC.

Throughout the county are numerous deposits of onyx, lithographic stone, red and gray sandstone, and other building materials. Notable among these are the extensive and beautiful onyx quarries at Big Bug. Extensive deposits of an excellent quality of lithographic stone are found on Sycamore Creek, fine red sandstone at Rock Butte, and red and white sandstone within 8 miles of Prescott. The latter quarries furnish a very fine quality of stone for building purposes, and it is being extensively used in the construction of homes and business houses in the city.

RAILROAD INTERESTS.

Yavapai County has four distinct railroad corporations, viz: The Santa Fe, Prescott and Phœnix, the United Verde and Pacific, the Prescott and Eastern, and the Congress Gold Company Line. The Santa Fe, Prescott and Phœnix runs from Ash Fork, on the Santa Fe Pacific Railway, to Phœnix, a distance of 200 miles, and is known locally as the North and South Road. The United Verde and Pacific Railway branches from the Santa Fe, Prescott and Phœnix at Jerome Junction and runs to Jerome, a distance of 30 miles. The Prescott and Eastern Railway leaves the main line near Prescott and terminates at Mayer, a distance of 28 miles to the east. The Congress Gold Company's road is but 4 miles in length, leaving the main line at Congress Junction, running thence to the Congress mine. There is no doubt that the railroad mileage will be materially increased during the coming year and the Santa Fe, Prescott and Phœnix line extended farther from its present routes to reach several important mining districts of the county. In fact, it seems to be the general belief that mining interests demand cheaper and more ready means of transportation, and no doubt is felt that the Santa Fe, Prescott and Phœnix system will meet the requirements. Since the completion of the road from Ash Fork to Phœnix, and running hand in hand, as it were, with its advent to Prescott, there has followed a

CONGRESS MINE, YAVAPAI COUNTY.

steady and stable growth of the commercial interests of this section, in mining, home building, lumbering, and immigration. The United Verde, Congress, Crowned King, McCabe, and other prominent mines owe their wealth and prosperity to its influences; the stock raiser, farmer, and lumberman are enabled to reach with their products other fields. This railroad has been in operation but six years, and while its volume of business in freight and passenger traffic nearly doubles with each year of its life, the industrial interests of the county have increased accordingly. In equipment and service this road is strictly first class. In the country it traverses the scenery is bewildering yet fascinating, and is relieved of that monotony always present in the plains of the East and the deserts of the West. Its headquarters are at Prescott, as well as the location of its machine and other shops.

MINES AND MINING.

The prediction of Humboldt that the mineral wealth of the world would be found in Arizona and New Mexico seems to be verified to-day. The correctness of that opinion seems to have been demonstrated. Mines that have been idle for years are once more resounding with the miner's pick and shovel, and a general waking up and activity is noticeable throughout the mining districts. More gold has been produced than ever before in the history of the county, and, what is even better, mining men have finally realized that this is the country of deep mining. The completion of the North and South Railroad has solved the problem of working the mines economically, and the industry is now entering upon its greatest era. New capital is coming in to develop the great properties of the county and the production of the precious metals is increasing daily.

With legitimate mines there has come a change in the scene, and the old has been pushed aside for the new, the benefit of which is to-day attested in this vicinity by the number of men on the ground and the manner in which they are operating. It is such an improvement over the played-out past, and the country is now being so firmly and legitimately handled in the practical and energetic work that goes with deep mining as to give us greater consideration, probably, than any other section of the Southwest.

The past five years has seemingly solved the future of this county as a mining section, and if only one-half of the mines being developed prove successful, Yavapai will be the most prosperous field for mining of any subdivision of the Union. Although one of the oldest mining sections in Arizona, it is nevertheless, in a practical sense, the newest.

Ten years ago there were not half a dozen gold claims in this section that had a 250-foot shaft, and in silver mines not many more. To-day in any district the opposite prevails, and when we look around and size up the miles of underground shafts and drifts in the United Verde, the 2,400-foot main shaft in the Congress, the thousands of feet of the Crowned King, the McCabe, the Jessie, the Empire, the Senator, the Poland Hamilton, Del Pasco, the Gladiator, the Favorite, the Peery, the Henrietta, the Accident, and especially the Planet Saturn, that has struck it at 1,000 feet richer than ever, the Johnson mine, and dozens of good prospects in the vicinity of Rich Hill in Weaver district, besides many others, we realize that the country asks to be "showed up."

Below are enumerated some of the plants in operation or ready to run, and with the general product of these must be associated the 150-ton smelter plant of the famous United Verde, which is running day and night, the 40 stamps (60 more now being added) and the 100-ton cyanide works of Congress, the Zonia copper smelter, the 2 smelters on Big Bug (soon to be in operation), the Prescott sampler, and numerous other smaller concerns, and over 15 cyanide plants, which in the aggregate represent over 500 tons of ore which is daily being handled from the mines of Yavapai County:

Congress, Lyons, Briggs, Sundance, Mescal, Red Rock, Last Chance, Pine Mountain, Empire, Yarnell, Henrietta, Harlan & Son, Etta, Monte Christo, Crown Point, Banell's, Crowned King, Richenbar, McCabe, Silver Flake, Placeritas, Dodge's, Sterling, Star, Waters, Bully Bueno, Peery's, O'Brien's, Senator, Pickrell, Providence, Jessie, Milligens, Storm Cloud, Harlans, Dividend, Del Pasco, Agua Fria, Cleveland's.

Big Bug is just as active as the Bradshaws. The Placeritas, Chaparral, Stanton, Lynx Creek, Briggs, Castle Creek, Humbug, Black Hills, Stoddard, Jerome, Santa Maria—in short, from one end of the county to the other, north, east, south, and west, the mines are nearly all producing, and if not producers are developing.

In talking with miners and endeavoring to form an estimated value of the proceeds of Yavapai mines for the current year which the above plants are expected

to return, and including ore shipments to the outside, $10,000,000 is placed as a very low and conservative figure.

In tonnage of ore handled for shipment outside and mining machinery hauled in, the Santa Fe, Prescott and Phœnix has in the past year handled more than in all of the previous years since it was built.

The year 1898–99 has simply been marvelous in production and in capital invested.

Assessed valuation of property in Yavapai County,

Land (61,069 acres)	$163,508.75
Improvements	107,155.00
Railroad land (232,036 acres)	46,407.14
Improvements	3,600.00
Land grants (99,289 acres)	62,055.62
Patented mines (299)	329,812.00
Improvements on patented mines	623,278.00
City and town lots	476,627.50
Improvements	569,457.00
Horses:	
Range (3,183)	31,830.00
Work (1,809)	53,695.00
Saddle (1,487)	41,660.00
Stallions (10)	550.00
Mules (74)	2,105.00
Asses (201)	1,882.00
Cattle, range (46,736)	467,360.00
Milch cows (929)	12,185.00
Sheep (51,938)	103,876.00
Goats (3,870)	7,640.00
Swine (558)	1,674.00
Railroad, standard gauge (60.552 miles)	103,051.46
All other property	1,021,328.85
Total	4,230,738.32

PIMA COUNTY.

County seat, Tucson.

County officers.—Supervisors, M. G. Samaniego, M. W. Bernard, L. M. Jacobs; probate judge, S. W. Purcell; district attorney, William F. Cooper; sheriff, L. W. Wakefield; treasurer, Harry A. Drachman; assessor, J. W. Bogan; recorder, C. A. Shibell; surveyor, Phil. Contzen; school superintendent, J. T. Hughes; clerk board of supervisors, W. P. B. Field.

Pima retains the legal classification as a county of the first class, that is, it still shows taxable property in excess of the required $3,000,000, notwithstanding that out of a portion of its territory a new county (Santa Cruz) of 1,200 square miles has been created since the last report. Last year the taxable wealth was fixed by the Territorial board of equalization at $3,753,340, and this year it is $3,376,512, or only $376,728 less than a year ago, although the territory surrendered for the new county makes the fine showing of $937,985 worth of taxable property. Altogether there is an increased valuation for the whole territory comprised within the former limits of the county of $561,157. As the assessed valuations are notoriously low, these figures indicate an actual increase in wealth of $2,000,000 over a year ago. As these figures show, no other county in the Territory is sharing to a greater extent than Pima in the general prosperity now prevalent in Arizona.

The progress made in the mining industry, so notable during the past few years, has continued unabated through the present year, greatly stimulated by the widespread revival of interest and confidence in mining, so manifest among the people of the Eastern States. Heretofore the development of the prospects and mines of this section has been made almost entirely by local energy and capital, but the great merit of Pima County mines is at last attracting outside capital in large quantities, and important sales are frequent. Promising prospects are being purchased by people financially able to develop them, and there were never so many prospectors exploring the hills as now.

The production of all the precious metals has increased during the year, that of copper particularly. The high price of copper having directed the attention of mining investors to Pima County, a number of the better-developed mines have

been equipped with modern machinery and smelters, while prospecting for copper is being rewarded by numerous new discoveries. Even silver is receiving more attention than for years past, and, taking advantage of improvements in machinery and the treatment of ores, silver mines that have been idle for years have been started up with satisfactory results.

In commercial lines the situation is no less satisfactory.

The live-stock industry remains in a flourishing condition. Heavy shipments of cattle have been made to the eastern and coast markets and sold at remunerative prices, while the increase on the ranges has fully maintained the supply. As a reference to the table of assessed valuations will show, the actual value of the cattle in the county approximates $1,500,000. Abundant rains in July and August put the ranges in a most satisfactory condition.

Considerable attention is being given to the larger production of sheep in the mountain ranges than heretofore, both on account of the higher price of wool, incident to the passage of the late tariff legislation by Congress, and the greater demand for mutton as an article of food, owing to the increased price of beef cattle.

The great mountain ranges of Pima County are especially fitted for the support of immense flocks of sheep; they produce large quantities of the most nutritious grasses which are not as accessible to the larger stock as to sheep. This field of sheep industry presents a decidedly inviting opportunity for the employment of capital with the most profitable results. This is especially so for the person with limited capital, as it takes much less capital to start into sheep raising than it does in cattle raising, while the returns in sheep are much earlier than with cattle.

Compared with other lines of business farming does not make the showing made in some other counties. The area of cultivated land has not been materially increased, and will not be until the adoption of some system of water development. But possibilities in that direction are very flattering, and the prospects for the construction of one or more reservoirs are good. It is only recently that the serious attention of our people has been generally arrested and directed to the possibilities and certain profits of an increased water supply; and the energy with which the question is being agitated promises important results for the county, which is certain in time to take a good position among the agricultural sections of the Territory.

Twenty per cent of the land of Pima County can be successfully irrigated and reclaimed by a system of ditches, subdrainage pipes, and reservoirs for water storage at a reasonable outlay, and 201,420 acres thus added to the cultivable area at an average cost of reclamation of $6 per acre. Wheat, barley, oats, alfalfa, hay, corn, sorghum, tobacco, potatoes, pease, beans, beets, all kinds of vegetables, fruit, etc., can be produced on these lands. The yield of wheat, barley, and oats will be from 35 to 40 bushels per acre; corn, from 40 to 60 bushels; hay, 3 tons; and alfalfa, 5 to 7 tons.

There are 650 acres of land devoted to orchards—peaches, apricots, nectarines, apples, pears, quinces, figs, pomegranates, and grapes being the most profitable crops.

Only about 10 per cent of the present fruit consumed is produced in the county.

The Santa Cruz Valley, which extends from south to north across the entire county, was undoubtedly the first seat of agriculture in the Territory of Arizona. The old settlements of Huebabi, Tumacacori, Tubac, Tucson, and San Francisco maintained a considerable population and supplied the Spanish military posts with provisions by agriculture in the earliest dawn of civilization on the American Continent, and the descendants of these early producers, augmented by more recent settlers, still carry on successful agriculture at all these points, and at many new places, until agriculture has become an important industry. For more than three hundred and fifty years, ever since the Spaniards first set foot in this section, crops have been produced in the Santa Cruz Valley every month in the year with irrigation and without a particle of fertilizer being used, and still the soil is rich and abundantly productive, and is annually growing richer from irrigation. Two crops are raised on the same land each year.

The running bodies of water are the Santa Cruz and San Pedro rivers, and the Pantano, Rillito, and Sonoita creeks. During the rainy seasons immense bodies of water flow to waste, which, if impounded, would bring thousands of acres of the most fertile land in the world under cultivation. In any of the valleys and on the plains where flowing water can not be found the same can be reached at a depth varying at from 10 to 600 feet.

County lands.

	Acres.
Total area	6,714,000
Surveyed lands	1,147,849
Unsurveyed lands	5,279,328
Unappropriated lands	6,426,677
Reserved lands	197,414
Disposed lands	89,909

As nearly as can be ascertained the amounts of land now under cultivation and irrigation in the county are as follows:

	Acres.
Allison ditch	1,000
City or Farmers' ditch	1,400
Between Tucson and Indian Reservation	2,000
Indian Reservation, 9 miles south of Tucson	1,200
Hart's ranch	100
Canoa ranch	200
Sopori district	500
Arivaca district	800
Pantano district	500
Rincon Valley	700
Tanque Verde and Rillito	3,500
Redington	1,200
Total	13,100

TUCSON.

The county seat, Tucson, is growing rapidly, and throughout the Territory Tucson is recognized as a place where the expression "hard times" is not heard. The claim is often made for Tucson that it is the wealthiest city of its size in the United States, and certainly there can be no question that it is among the most solid towns financially in the country.

Tucson, founded about the year 1555, as is proven by the ancient records recently discovered among the archives of the San Xavier Cathedral, was a Jesuit settlement long before the institution of San Augustine in 1595, and Santa Fe in 1605, and in consequence is entitled to the honor of being the mother of cities so far as the United States is concerned.

The trials of the Catholic padres, surrounded as they were by dangers and almost insurmountable obstacles of every character, make an interesting story too long to be told here. At the same time the charm of antiquity, tinged though it may be by the innovations of modern civilization, is with it still. The Spanish adobe architecture, demonstrated by experience to be the most suitable for the prevailing climatic conditions, is prevalent to an extent greater perhaps than in other Arizona cities of its size. Yet Tucson has very many handsome modern dwellings and business houses of stone and brick, which contrast strangely with the low but comfortable structures of sun-baked brick. In them is blended the romance of the past and the realistic conditions of the present.

Containing 10,000 inhabitants, the ancient city does an enormous business annually with the surrounding counties and the State of Sonora, Mexico. Its mercantile institutions are among the largest and most important in the Territory. Owing to its enviable standing as a cash town, due to the fact that it is the commercial center of important mining, cattle, and railroad interests, its prosperity is unquestioned. Discounting their bills and purchasing in large quantities, the merchants are enabled to sell at prices which compare favorably with the rates prevailing in much larger places.

The past three years have shown a steady and marked advance in the construction of modern buildings, particularly in the matter of business blocks and tasteful dwellings. Upper Congress street, a wide and handsome thoroughfare, has been lined with brick and stone structures, the majority of them containing two stories and basement and all new and in strict conformity with the requirements of the time. The demand for such buildings is greater than the supply, and each is engaged long prior to its completion. An excellent indication of the financial condition of the town itself is the fact that all realty improvements are based strictly upon home capital, which appears to be both plentiful and cheap.

Hundreds of pretty dwellings, built by the two building and loan associations, have been erected, so that entire new blocks have sprung into existence, necessitating a street-car service, an innovation unthought of by the Tucsonian five years ago.

COURT-HOUSE AT TUCSON.

WORKMEN'S BLOCK AT TUCSON.

The Southern Pacific Railroad Company has extensive repair shops and roundhouses in Tucson, second only in importance to the shops at Sacramento, Cal., and necessitating the employment of a large force of men. Between $65,000 and $90,000 in wages are paid every month, nearly every dollar of which remains in the town. Tucson is preeminently a commercial center, the surrounding country, owing to its topography and lack of irrigating canals, being far from agricultural in its nature. The cattle industry, large and rapidly growing, is most important and a prominent factor, since the results of the semiannual trades are directly to her financial betterment. She is as well the base of supplies for the numerous mining camps scattered through southern Arizona.

One of her conspicuous manufacturing enterprises is the immense 4-story flouring mill, which from a modest beginning has sprung into one of the largest concerns of the kind in the West. A curious feature, and one scarcely credible were it not strictly true, vests in the proposition that these mills flourish in a locality where very little if any wheat is grown. In the beginning the company procured its raw wheat from California, and, despite the cost of transportation, was able to manufacture it into the finest flour and reship at a profit to outside points. At present, however, the principal supply comes from the Salt River Valley and Pinal County.

A drawback heretofore has been the insufficient water supply. This defect is now being remedied by the erection of modern waterworks, affording an adequate supply for all purposes, including sewerage facilities.

An illustration of the financial condition of the town is the work recently accomplished by the various fraternal societies. The A. O. U. W. lodge owns a magnificent brick block on a principal business street, which yields a monthly rental of $400 and upwards. The order of Elks have constructed a fine 3-story brick building, to be devoted entirely to the uses of the society, which has cost, with the ground and furniture, in the neighborhood of $20,000. The Masons have a very elegant structure which would reflect credit upon cities many times the size of Tucson, and these show plainly the earnest backing of a prosperous community, else such results could never be accomplished.

Tucson is situated in southern Arizona on the line of the Southern Pacific Railroad, about 500 miles east of Los Angeles, about 300 miles west of El Paso, and about 670 miles south of Denver, almost in the center of the climatic belt recommended by the United States Medical Commission as the most favorable region in the United States for those afflicted with pulmonary ailments, asthma, and various chronic diseases.

Altitude above sea level 2,420 feet. The climate is dry and pleasant during the entire year. During the months of June, July, and August the average temperature is about 90°, but there is so little humidity in the atmosphere that little inconvenience is experienced. This mild, semitropical atmosphere is probably owing to the physical conditions which are prominent. The Santa Catalina, the Rincon, Tucson, and Santa Rita mountains form a circle of high mountains curving three-quarters around the valley, to the west of which stands another range, all of which prove a complete barrier to storms. While three of the summer months are warm during the day, the nights are always cool. This is on account of the rarified condition of the atmosphere, which becomes instantly cool on the setting of the sun, there being no humidity to retain the heat.

The fall, winter, and spring months can be compared with the Italian climate. There is little or no frost. Flowers bloom during the entire winter months, and much of the shrubbery retains its foliage. As compared with the southern California climate, Tucson and its surroundings are far superior in every respect, and such is the verdict of invalids who have tried both localities.

Dr. N. H. Matas, a physician of high merit and eighteen years' practice in this city, among other things, says:

"Since consumptives must depend on the resisting forces of nature for the cure of their disease, it is evident that an early selection of a good winter climate is the most important factor for their cure and future welfare. They need a warm, dry climate in winter, free from fogs, heavy frosts, storms, chilling winds, and sudden atmospheric changes, and a climate where there is constant sunshine and plenty of pure air and where they can have outdoor exercise daily. Treatment as well as climate must be undertaken early to do good when there is yet a good foundation upon which to build the system. We must remember that nature alone cures, and where there is no nature there is no hope. Physicians and climate can only help nature, and they can do no good when nature is destroyed."

The official weather reports and observers of the United States, as well as the scientific climatologists, admit that Tucson is the center of the most favorable zone in the Southwest for the improvement and maintenance of life for consumptives in the United States if not in the world.

Dr. W. B. Purcell, county physician, observes: "It is an undisputed fact that proper climatic conditions give the greatest relief to those afflicted with or having a tendency to phthisis. When a phthisical tendency exists great care should be exercised to prevent its development; as humidity is such an important factor in the cause of consumption, those afflicted with or having a predisposition to lung disease should immediately seek the proper climate favorable to their conditions.

"The climate of Colorado has been recommended for its beneficial effects for consumption. My long residence there gave me ample and sufficient opportunity of judging climatic conditions there existing during the summer months. The mountainous portions of Colorado have undoubtedly a beneficial effect on tuberculosis subjects, but I can not recommend Colorado during the fall and winter as the changes are often severe, becoming raw and cold within a few hours, and as these are atmospheric conditions to be avoided, it would not be advisable to spend these seasons there. Those having a peculiar type of constitution with a hereditary tendency to consumption, would do well to avail themselves of an opportunity and come here and remain exempt from disease. It is a fact that those born here of tuberculous parents seldom if ever have the disease develop so long as they remain in this climate. It is my opinion that there is no other section of the United States which will compare favorably with that in and about Tucson for the relief of pulmonary affections."

The Hon. Whitelaw Reid in his journal, the New York Tribune, on Arizona in winter, among other things, says: "During five months' residence in southern Arizona in winter time there was but one day when the weather made it actually unpleasant for me to take exercise in open air at some time or other during the day. Of course, there were a good many days which a weather observer would observe as cloudy, and some that were showery, but during this five months (from November, 1895, to May, 1896) there were only four days when we did not have brilliant sunshine at some time during the day. Even more than Egypt, anywhere north of Luxor, Arizona, is the sunshine. The nights throughout the winter are apt to be cold enough for wood fires and blankets; half the time an overcoat is not needed during the day, but it is never prudent for a stranger to be without one at hand.

"The atmosphere is singularly clear, tonic, and dry. I have never seen it clearer anywhere in the world. It seems to have about the same bracing and exhilarating qualities as the air of the great Sahara, in Northern Africa, or of the desert about Mount Sinai, in Arabia Petræa. It is much drier than any part of the valley of the Nile north of Cataract. It seems to me about the same in quantity as the air on the Nile between Assouan and Wady Halfa, but somewhat cooler."

TUCSON INDUSTRIES.

Tucson has a population of 10,000, about one-third of Mexican descent It is the commercial center for southwestern Arizona and northern Sonora, Mexico. It is the seat of Pima County, the location of the United States surveyor-general's office, the United States land office, the United States district court, and the United States marshal's office. It is the headquarters of two divisions of the Southern Pacific Railroad, comprising over 600 miles of the line; also the shops, roundhouse, etc. The monthly pay roll averages from $60,000 to $90,000 to its employees, which adds much vitality to the commercial prosperity of the city. The city is lighted with electricity and gas, and the telephone and street railway are well sustained. The water is supplied from the Santa Cruz River, and is absolutely pure.

There are nine hotels, most of which are conducted on the European plan, and a score of restaurants and lodging houses. Cost of entertainment at hotels ranges from $1.50 to $5 per day; furnished rooms can be had at from $5 to $15 per month, and table board from $4 to $7 per week.

Several important industries are located here, among which are the Eagle Flouring Mills—the largest in the Territory, two ice factories, machine shop, ore-reduction works, and sampling works. There are also various classes of mercantile houses—6 wholesale, 2 grocery, 5 clothing, and about 80 retail stores, 3 furniture, 2 tin, glass, china, and other wares; 3 drug stores, 3 stationery, 3 jewelry, 4 livery stables, 2 daily and weekly newspapers—the Star and Citizen and El Fronterizo, a Mexican, 17 practicing attorneys, 11 physicians, 4 dentists, 2 photographers, four Protestant churches—Methodist Episcopal, Congregationalist, Episcopalian, Baptist—and Catholic; all are supplied with able pastors.

TUCSON CATHEDRAL, TUCSON.

INVESTMENT OPPORTUNITIES.

Tucson is on a remarkably sound financial basis. Business failures during the last five years have been practically unknown. Many brick buildings have been built during the last year; scores are now under construction. Commercial houses are steadily increasing in number.

The ruling price of money is from 1 to 1½ per cent per month on best security. A large volume of money could readily find investment here on gilt-edge security at from 6 to 8 per cent per annum. A loan and savings bank would be a safe and profitable business as there is no tax on mortgages; the value of interest speaks for itself.

Tucson has 2 flourishing national banks, 2 building and loan associations—one with a capital of $65,000, the other $25,000. This being the center of a vast stock country shipping from this point is very large, and as the country for more than 100 miles tributary is rich in gold, silver, and copper, and vast marble and onyx beds, the financial business of Tucson is very great.

EDUCATIONAL.

Tucson has an organized municipal government with mayor and city council and excellent public buildings; a public library which would do well for a city of 20,000 inhabitants; is the seat of the University of Arizona, under management of which are the agricultural college, the school of mines, and the United States experimental station. It is favored with a strong faculty of 17 professors, and at present 100 or more students. Tuition free, dormitory accommodations and table board, $15 per month. The college equipments are equal to the best in the land. Families who come to spend the winter here can allow their sons and daughters to enjoy the advantages of this institution, while they are assimilating the vigorous tonic of the climate.

The public schools are on a high plane, well graded, with an able corps of 14 professional teachers, receiving salaries ranging from $60 to $125 per month; excellent buildings of modern style of architecture.

The St. Joseph Academy for young ladies, under the management of the Sisters of St. Joseph, and the parochial school for boys, under supervision of the Catholic Church, have a large attendance.

The Indian Industrial Mission School under the auspices of the Presbyterian Home Mission is established here with an average attendance of 150 Indian boys and girls.

Taking into consideration the many natural advantages, our rich climatic resources, our vast deposits of mineral, opportunities for agriculture, and the stock industry, and other general interests tributary to Tucson, no better field is opened for the profitable and safe investment in scores of industries, and the development of wealth resources.

NEIGHBORING POINTS OF INTEREST.

Because of its antiquity there are many places of interest within the radius of a few miles of Tucson, notably the San Xavier Mission, the old mission church of Escala Pura, the abandoned Government post Fort Lowell, and the fortified hills west of town. By whom or by what race the fortifications were built is not known, but their lines of defense are still plainly visible. Many large rocks, having an eastern face, are covered with hieroglyphics of a lost race, and the riddle has yet to be read. For many miles north of town, in the Santa Cruz Valley, are to be found evidences of dead cities. The plains may bear no mark of human occupation, but relics of the past are unearthed by a little labor. Broken pottery, ornaments, household utensils, implements of agriculture and war are common to the inquiring mind of the archæologist. Burial urns, with their incinerated contents perfect as the day when they were first consigned to the earth, are occasionally to be found. The whole country is full of interest, not only for the capitalist and the home seeker, but for men of leisure in search of recreation and the invalid in quest of health.

WATER SUPPLY AT TUCSON.

There are two chief sources of water at the city of Tucson—one from the valley of the Santa Cruz, the other the underground flow from the Rincon and Catalina mountains. The Santa Cruz heads in the mountains south of the city and across the line, in Sonora, Mexico, and flows northerly to Tucson, where it sinks below the surface and continues onward toward the Gila at or near Casa Grande. Even

above Tucson it can not be called a steadily flowing stream above ground. It sinks and rises at intervals and only in seasons of flood it deserves the name of a river. The course of the Rillito flow is from east to west or northwest, and this water course, like the Santa Cruz, is dry at some seasons and in flood at others. But there is a well-defined underground flow—not only along the immediate valley of the stream, but under the broad, gravelly mesa which skirts the Rillito and the Catalina and blends with the mesa slopes of the Santa Ritas in the southeast. The Rillito drainage becomes confluent with the Santa Cruz a few miles below Tucson, from which point the flow may be considered as one extending underground northerly and westerly toward the Gila River. It may be said that water can be obtained by wells or by boring at almost any point along the course of these streams. The Rillito flow not only follows the main channel or trough of the valley, but is believed to extend out laterally under the broad mesa south of it. The flow must receive a considerable accession from the water of the Sabina, which, at times during the year, when the rains are heavy or when the snow accumulates and melts on the summit of the Catalinas, becomes a raging torrent even as far down from the mountain as the edge of the plain or mesa and even to the Rillito. At other seasons, when the water supply is greatly reduced, the torrent disappears and shrinks back to the inner and higher gorges, where, however, there is a continuous flow during the entire year, and there can be little doubt that there is an underground flow even to the Rillito. The existence of an underground flow along the slope of the mesa north of Tucson, and upon which the University of Arizona is located, is made known by wells. These wells vary in depth from 50 to 100 feet, depending upon the rise of the ground or surface of the mesa.

The well at the university is about 100 feet deep and 7 feet in diameter. It is sunk through granite "wash," a coarse gravel, which alternates with pebbly and sandy layers, some of which are mingled with red arenaceous clay. The same conditions were found at the well of W. P. Blake, on the same mesa, about one-quarter of a mile west. This well is 6 feet in diameter and 90 feet deep. Water stands in it to a depth of 3 to 4 feet, and as at the university well flows in as fast as it is drawn out.

CHEMICAL ANALYSIS OF TUCSON WATER.

Prof. W. H. Forbes, chemist of the United States agricultural experiment station at the University of Arizona has made a chemical investigation of the drinking water of Tucson, the samples being from the new wells for the supply of the city.

Two samples were taken from the company's wells. The first sample was composed of equal parts from each of the west four wells, and the second, in like manner, from the east three wells in the company's trench just south of town. The complete analysis of the sample from the west four wells, from which it is understood the city supply will be chiefly drawn, is as follows:

West four wells of new waterworks.

[Parts in 100,000.]

Sodium chloride (common salt)	3.95
Sodium sulphate (Glauber's salt)	16.18
Potassium sulphate	.74
Calcium sulphate (gypsum)	1.74
Calcium carbonate (tem. hardness)	14.49
Magnesium carbonate	4.07
Iron oxide and alumina	.40
Silica	3.10
Total solids in 100,000	44.67

NOTES.

Organic matter	Faint traces.
Nitrates	Traces.
Nitrites	Faint traces.

This is not an alkaline water.

The samples from east three wells contains: Total solids in 100,000, 35.40. This water is of the same general character as that from the west four wells.

Organic matter, none; nitrates, traces; nitrites, faint traces. A complete sanitary analysis of these samples was not made, for the reason that the wells are at present open, unprotected, and not continuously pumped, and are consequently subjected to contamination from matter blown into them from the surface of the surrounding ground.

It is interesting to note that the salts are largely of the nature of limy hardness, which is deposited when the water is boiled. Calcium sulphate, which is particularly objectionable as the cause of a very hard and refractory boiler scale, is also present in small amount. Sodium chloride and sodium sulphate are neither of them present in objectionable amounts.

Assessed valuation of property in Pima County.

Land (48,146 acres)	$163,311.00
Improvements	95,413.00
Land grants (25,888 acres)	6,472.00
Improvements	4,500.00
Patented mines (152)	59,100.00
Improvements on patented mines	13,000.00
Improvements on unpatented mines	13,100.00
Town and city lots	719,177.00
Improvements	881,205.00
Horses:	
Range (2,386)	23,860.00
Work (841)	22,037.00
Saddle (863)	16,025.00
Stallions (42)	1,560.00
Mules (209)	5,265.00
Asses (23)	115.00
Cattle range (40,454)	404,540.00
Milch cows (269)	4,955.00
Bulls (158)	3,310.00
Sheep (2,990)	5,980.00
Goats (482)	964.00
Swine (339)	1,017.00
Railroad, standard gauge (64.75 miles)	394,417.40
All other property	537,189.00
Total	3,376,512.40

YUMA COUNTY.

County seat, Yuma.

County officers.—Supervisors, Dr. P. G. Cotter, C. V. Meeden, T. W. Underhill; probate judge, W. E. Marvin; sheriff, John M. Speese; district attorney, C. L. Brown; treasurer, D. L. DeVane; surveyor, W. H. Elliott; recorder, W. E. Marvin; clerk board of supervisors, W. E. Marvin.

Yuma County, one of the four original political subdivisions of the Territory when it was first established by the act of Congress on February 24, 1863, as an independent commonwealth, forms the extreme southwestern portion of Arizona. It lies between 32° and 34° 2′ north latitude, and 113° 20′ and 114° 14′ west longitude. It is bounded by Pima, Maricopa, and Yavapai counties on the east, the Colorado River on the west, Mohave County on the north, and Sonora, Mexico, on the south. It has an area of 10,138 square miles (6,488,320 acres), an expanse greater than any of the seven smaller States of the Union, and larger than Connecticut, Rhode Island, and Delaware combined.

For more than 100 miles it is crossed from east to west by the Gila River, which thoroughly drains the southern and eastern portions, eventually flowing into the Colorado at the town of Yuma, while the Colorado washes its western boundary, effectually draining the remainder.

The topographical configuration of the surface includes a series of wide plateaus, rising gradually from a point situated at the southwestern extremity, with an altitude of 60 or 80 feet above sea level to an elevation in the north and northwest very much higher, the whole sloping gently in a southwesterly direction.

These plateaus are crossed by numerous mountain ranges, especially in the northern part, the ranges being separated by broad valleys, many consisting of excellent lands. The various mountain systems, though rough and abrupt in character, are highly mineralized, carrying gold and silver, copper and lead, iron, and other metals in paying quantities. The eastern and southern divisions include

gradually sloping plains, covered in places with natural grasses and trees, among the latter being the mesquite, ironwood, and palo verde. Here and there are detached hills and spurs of eruptive origin.

All the country embraced within the county confines, situated north of the natural watershed of the Gila, owing to the slight rainfall and few streams from which water can be taken for agricultural purposes, is practically worthless, so far, at least, as the feasibility of bringing large bodies of irrigable land under cultivation is concerned. The available arable region, therefore, is limited to broad strips of country lying directly north of the Gila and east of the Colorado River, and also hundreds of miles of splendid lands stretching directly southward from Gila River to the Mexican frontier. Consequently, it is upon these rivers that water-storage reservoirs must be established.

It is more than probable that less is known of the physical and topographical peculiarities of Yuma County than of any other county in the Territory. According to the map of the Interior Department, issued from the General Land Office in 1883, it is shown that less than 10 per cent of the total area was surveyed by the Federal authorities. It is believed that no further surveys have been ordered since the date mentioned, and therefore so far as official recognition extends, more than nine-tenths of the county is a veritable terra incognita. The population numbers 3,200 souls.

THE VILLAGE OF YUMA.

Although the town of Yuma is the second oldest community in the Territory of Arizona, it is astonishing how little its resources are known to the world at large and how slightly developed is the natural wealth of the county. This is owing to Yuma's reputation for unbearable heat, and partly to the fact that, lying next to California, it has been assumed that the country has been thoroughly prospected for mineral wealth, and prospectors have, in the main, kept the traveled highways in crossing its territory. As a matter of fact, one suffers less from the heat here than in almost any of the settled communities of the East, owing to the dryness of the atmosphere, and there is no healthier climate anywhere.

People labor out of doors from the rising to the setting of the sun and suffer no inconvenience. There has never been known in this section of the country an authentic case of sunstroke. Our climate, taken in time, never fails to cure pulmonary complaints of any description. Diseases such as smallpox, cholera, etc., rarely visit us, and then only in a very mild form, and are never fatal except through the perversity of the patients. Contrary to the belief of the uninformed, the dry heat of the summer months is especially conducive to good health and exceptional vigor, acting naturally upon the human system with the same effect as the artificial results of a Turkish bath, purifying and renovating it. As a further matter of fact, this county has never been even superficially prospected, and it is only now that the people are beginning to search its hills with any degree of systematic enthusiasm for the mineral wealth hidden there.

Portions of country traversed for years by commonly traveled trails are developing into rich storehouses of golden wealth. New and rich placers are being discovered, and shipments of placer gold from this point, through Wells, Fargo & Co.'s Express, are increasing in value. From a mining standpoint Yuma County is rapidly developing, and yet, as far as that industry is concerned, this section has received but little recognition.

Agriculturally, the country is fast improving. Enterprises that have lain dormant the last two years, owing to the general financial depression and consequent dearth of money for investment purposes, are waking up to new life and vigor. A greater area of old farms has been put under cultivation, and new lands have been inclosed and new fields started. Fields of cereals and alfalfa have been added to the cultivated area on the Colorado River below town; the lands lying under the Mohawk and Farmer's canals have been made to yield heavy crops of every variety of agricultural products, as in other sections of Gila Valley, and the gardens of Yuma have been added to and beautified in fruits, flowers, and shrubbery. Altogether, we may feel proud of our progress.

It speaks well for the industry and pluck of our people, and the showing made constitutes the best evidence of the merit of our soil and climate and the richness of our mineral resources.

The Territorial penitentiary is situated at Yuma.

THE CLIMATE.

It is not the intention to dwell in detail upon the sanitary advantages offered by our most perfect climate, and yet a few words upon this subject may not be inappropriate.

Nine out of every twelve months the climate is simply superb. Three months are

warm, but not excessively so, although the thermometer ranges far higher than would be conducive to health or comfort in any section of the East. The conditions, however, are most dissimilar, as may be seen by the following, taken from an official communication of Lieut. W. A. Glassford, of the United States Signal Corps, to the governor of the Territory of Arizona in 1897:

"A few words upon the heat. It is recorded as extreme, yet no one suffers and sunstrokes are unknown. This is usually accounted for from the purity and dryness of the air. Both are true, but the dryness is, perhaps, the correct reason. I have calculated between the shade and sensible temperatures at Yuma during the heated hour of the day, and it is about 30°. At New York or Washington it is only a few degrees less and often identical. The highest shade temperature ever recorded at Yuma is 118°. When the heat is at this point the sensible temperature is about 88°. The shade temperature at New York being 105°, the sensible temperature is certainly nearly 100°. The difference between the mean temperature and the mean sensible temperature for July is over 17° at Yuma. These considerations of the sensible and shade temperatures will account for the absence of any detrimental effect from the extreme heat of Arizona.

"The air is dry; the moisture in the atmosphere is from 25 to 30 per cent as against 75 to 85 per cent in other localities. Every afternoon in summer there is a refreshing breeze from the Gulf of California that relieves the day of undesirable heat. It passes over a desert, much of which is below sea level, that acts as a desiccant, so that when the plains of central Arizona are reached the air is dry to the last possible degree.

"There are neither sunstrokes in summer nor pneumonia in winter; neither fever nor malaria live nor generate in this section. The air is absolutely free from those compounds that poison the system and bring disease. In no country is there a greater number of bright nights and sunny days. Hundreds afflicted with lung trouble, after visiting Florida and southern Cafifornia, have found relief in this invigorating climate, where the pure air is a tonic to shattered constitutions, a healing balsam to the consumptive."

The meteorological conditions are indeed admirable for the cure of all rheumatic, bronchial, and pulmonary troubles, as has been proven time and again. In summer the rapid evaporation lowers the temperature and promotes comfort, while in winter the mild, equable, and pleasant weather is delightful and healthgiving to the invalid.

Concerning the effect in regard to early fruit, the late commissioner of immigration, Hon. Cameron H. King, has this to say:

"The average spring, summer, and autumn temperatures of Yuma are nearly 9 degrees more than at Riverside, Cal. This is sufficient to explain the fact that the citrus and other fruits of Yuma ripen from a month to six weeks earlier than at Riverside or other points in southern California.

"Yuma has an earlier and warmer spring. The trees have an earlier start, and the higher temperature matures the fruit sooner. It is evident, since oranges ripen in Yuma by the 15th of November instead of about the middle of January, as in southern California, that the fruit in Arizona can never be injured by any low temperature in the winter season. And since the labor of the tree is for the season practically over at Yuma before the winter season begins, it is better prepared to stand a low temperature in winter than it could in California, even were the atmosphere as dry in the latter State as in Arizona,

"It is known that Riverside raises better oranges than the country around Los Angeles, and the reason is that Riverside escapes the fogs which hang over Los Angeles.

"It is proper to observe the maximums and minimums of temperature, as shown by the Signal Service records, are of little practical utility, since such extremes may not last more than a second and may be the effect of one small wave or ripple of air.

"The warm sunshine of the spring, summer, and autumn days causes the fruit in Yuma to mature early and gives a delicious sweetness, flavor, and color to the orange, lime, lemon, and other citrus fruits which they can not attain on the coast of the Pacific, where fogs dampen the fruit, mildew is produced, and dust coats both fruit and leaf."

It is undeniable that nowhere on the face of the globe can a spot be found more favorable than this for the growth of the citrus fruits.

The statements of the commissioner can be thoroughly substantiated, as may be seen by the following, showing the time of maturity for certain products: Strawberries, January 15; apricots, April 1; mulberries, April 14; figs, April 10; grapes, June 1 to 7; watermelons, May 20; peaches, June 15; pomegranates, August; limes, September 5 to 10; lemons, September 15 to 25; dates, September 1; oranges, November 15 to December 1.

WATER SUPPLY.

The original source of water supply is comprised in the fall of rain and snow in Arizona and the States and Territories north and northeast of it. Where the fall is greater than the evaporation, the water eventually finds its way to the rivers and streams that drain the mountain ranges by seepage, percolation, and surface flow. It may also be taken from springs and wells fed similarly. Water occurs in any portion of the Gila and Colorado valleys at a depth of from 12 to 25 feet; but, of course, the quantity thus obtained is insufficient for extensive irrigation. But the supply upon which the settlers are forced to place reliance is the inexhaustible volume that during high water passes along the channels of the Gila and Colorado rivers to the sea. The drainage of much of Nevada, Utah, Colorado, and all of Arizona finds lodgment in the Colorado throughout its 1,200 miles of channel. An admirable feature in this connection is the peculiarity of reaching its highest dimensions in the months of June and July, the very time when other streams are low. But it must be said that there is sufficient at all times to irrigate every acre of land under and tributary to it. The river supply at the season of irrigation is greater than that of all the utilized streams of California combined.

The Gila at certain annual periods spreads to close upon 2 miles, where the surface contour so permits, with an average depth of 4 feet. In June, July, and August for 40 miles from its mouth it is either very low or absolutely dry, although considerable running water can always be found along the rock bed. It happens frequently that where reefs of rock cross the river the water comes to the surface, only to disappear again when the barrier is passed. An excellent site for storing enormous bodies of water has been surveyed by a competent engineer, the location being in the Gila Valley, as well as the outlying mesas and higher plains, while the construction will not be attended with unusual difficulties, nor would the cost prove excessive in comparison with the increased value of the lands, large portions of which are worthless. Such works would effectually obviate the disheartening effects of the sinking of water to bed rock in summer, for the amount saved during high water, that would have otherwise gone to waste, would furnish the means of livelihood to a large population as against the present population, which is very meager.

The Colorado and Gila are considered among the most prominent streams of the Pacific coast, and afford more than sufficient irrigation capacity for the cultivation of the rich areas included within the county lines. The former drains a catchment area of more than 242,000 square miles of mountainous country, while the latter also drains an immense surface, very similar topographically. Thus, it can easily be seen that water is abundant.

TRANSPORTATION.

An important factor in connection with the early ripening of horticultural, viticultural, and agricultural products is the question of easy and rapid conveyance to prominent market centers east and west. The Southern Pacific Railroad, one of the largest transcontinental lines in America, passes through the city of Yuma, runs through the Gila Valley as far as Adonde, a station some 30 miles east of Yuma. It then passes upon the mesas south of Gila River, the track extending upon the average not more than 5 miles from the river until the county line is reached. Thus is afforded convenient egress from any section of the valley and direct communication from thence to all parts of the United States.

Other railroads have been surveyed along both sides of the river. The direct broad-gauge line to San Diego, which heretofore has been a matter of conjecture, will, beyond a doubt, soon be a reality, one of the results of the settlement of the vexed grant question, mention of which will be found elsewhere in this article.

The Colorado River, being navigable, affords transportation by light-draft river steamers, northward from Yuma to the Needles, where connection is made with the Santa Fe Pacific, thence on to the Grand Canyon of the Colorado, and southward from Yuma to the Gulf of California. The Colorado Steam Navigation Company is now constructing in Yuma a new light-draft steamer to make regular trips up and down the Colorado River. The new boat is to be known as the "Cochan," and since the recent rich mining discoveries and the marvelous irrigation and agricultural developments have been made up and down the river, the glory of the old steamboating days (when the supplies for all Arizona were boated up the river) is expected in part to be revived.

CANALS OF YUMA COUNTY.

There are five large irrigation canals operating in Yuma County and various others are being projected which will in a matter of time be built. Canal building is comparatively of recent origin in the county. A few years ago the fetlile valleys were almost literally destitute of human inhabitants, while to-day it is safe to say that every acre of valley land along the line of the canals has been filed upon, not to mention considerable mesa land taken up along the line of their projected extensions. The Mohawk Canal is taken out of the Gila River, and irrigates about 40,000 acres of the Mohawk Valley, there being no shortage of water, in all seasons. The Farmer's, the Ives, and the American canals are taken out of the Colorado River below Yuma and can be made to irrigate 100,000 acres or more of the richest bottom land on earth, their water supply being abundant.

The Cibola Canal is taken out of the Colorado River about 50 miles above Yuma and covers an area of 25,000 acres. For further mention of the Cibola Valley, see another page.

The "duty" of water is not constant, but varies according to the locality. It should be explained that but little of the land has been irrigated earlier than five years ago, and being virgin soil requires more water than will be necessary during the coming seasons. For this reason it is fair to assume that the "duty" per inch will be materially increased.

It may be stated incidentally that by irrigation the fertilization of land fluctuates according to the nature and quantity of the silty matter deposited upon it by the water, and this, it is estimated, is from 80 to 100 per cent. Both Gila and the Colorado are especially rich in such matter, and therefore the constant fertilization effected through the opening canals renders any further enrichment of the soil superfluous, useless, and unnecessary,

SCHOOLS.

There are 9 public schools in Yuma County and 1 high school. Twelve teachers are devoting their time to the education of over 600 scholars. The average school term is seven months. The high school in the Yuma district is presided over by a thoroughly competent professor, and the graded schools of this district require the services of 4 teachers. The Catholics have also a parochial school, presided over by the Sisters of St. Joseph. It is in a prosperous condition.

NEWSPAPERS.

There are 2 weekly newspapers published in the county—the Arizona Sentinel and the Yuma Sun. Both papers are published in the village of Yuma.

CHURCHES.

There are two regularly organized churches in the county, viz, the Roman Catholic and the Methodist. These are in a flourishing condition and are well attended.

RIVERS.

The Gila.—The Gila River, though second in size to its mighty rival, the Colorado, is destined, for the present at least, to figure far more prominently in the solution of the problem of redeeming and making valuable to the husbandmen the immense bodies of hitherto arid and valueless land tributary to it.

The Gila drains a vast territory. Rising in the western part of New Mexico it flows in nearly a westerly direction through the entire Territory of Arizona. Its northern and eastern sources are among mountains covered for several months in the year with snow of varying depths, the melting of which, added to the many natural springs emptying into it at different points, forms a considerable river long before it passes through Graham County. It enters the Gila Valley some few miles above Florence; thence for nearly 300 miles it winds through the now famous Gila Valley, eventually merging into the larger stream at the village of Yuma. The total length of the river is 650 miles. Before reaching the eastern boundary of Yuma County it is fed by numerous rivers, among the most important being the San Pedro, a stream rising near the line between Sonora, Mexico, and Arizona.

Another noble tributary is the Salt River, in itself a large stream, having its head waters in the White Mountains. It enters the Gila some distance below Phenix. An important adjunct toward increasing the volume of the Salt is the heavy rainfall about Prescott, amounting during the last ten years to an average

of 15.18 inches annually. Other rivers, like the Agua Fria, Hassayampa, and the Santa Cruz, bring down further supplies drained from the heavily timbered mountain regions traversed by them in the north and from the mountainous regions of the south.

Thus, the major portion of the year the Gila carries a large stream, more than sufficient, in fact, to irrigate a domain princely in extent. None of the rivers so far touched upon, however, are navigable.

THE COLORADO.

The Colorado River is formed by the union of the Green and Grand rivers. The former rises in Wyoming, the latter in Colorado. From their junction the stream takes the name of the Colorado, and following a generally southerly course flows into the Gulf of California. The entire length, including tributaries, is over 1,200 miles. It flows, during the low-water period, at a rate not exceeding 4 miles an hour, although, of course, the speed is very much greater when the river is high. Among the principal feeders are the Rio San Juan, the Colorado Chiquito, the Bill Williams Fork, and finally, as already explained, the Gila.

The Colorado constitutes the entire western boundary of Yuma County, its total length between the Sonora line and the Bill Williams Fork—the latter forming its northern boundary, separating, as it does, the counties of Yuma and Mohave—being about 235 miles. It is navigable for nearly 650 miles from the Gulf of California to the Virgin River by steamers regularly registered and licensed. The river is capable of affording at all periods an almost incredible amount of water for irrigation purposes, sufficient, in fact, to bring hundreds of square miles of fertile lands on each side of the river under cultivation, and thus provide support for an enormous population.

LANDS AND SOILS.

Within the limits of Yuma County there are large aggregations of Government land. The majority of the most favorably situated in the valleys were the first taken, the early pioneers occupying the tracts nearest the rivers, for the reason that they could be more cheaply irrigated. The mesas are for the most part unoccupied, although they comprise much of the most desirable land, such especially as are adapted to the growth of the citrus and other semitropical fruits. Water can not be easily brought upon them on account of their elevation above the river bed. Canals capable of carrying sufficient water for irrigation would entail comparatively heavy expense, because many miles must necessarily be constructed before the water can be brought to the surface. Such outlay would prove too expensive for the slender resources of the average settler, and so, as matters stand, they lie idle under the rays of a semitropical sun, untouched by the spade and plow. This condition of things, however, can not long continue. Neither physical nor topographical difficulties exist that can not be surmounted by the expenditure of a reasonable amount of capital.

It may be safely assumed, in view of what has just been said, that the large bodies of available agricultural land are confined to the valleys of the Gila and Colorado, and also to the comparatively level plains stretching from the Gila River to the Mexican line.

THE GILA VALLEY.

The Gila Valley extends from the Gila Canyon, near the junction of the San Pedro River, westerly to the east bank of the Colorado, a distance of slightly exceeding 250 miles. That portion of it situated in the county of Yuma, known as the Lower Gila Valley, is about 100 miles long and from 2 to 10 miles wide, all of which is susceptible of profitable cultivation. The river from which it takes its name cuts the valley in two. Its watershed extends some 30 miles north and upward of 50 miles south of its channel, the land from either extreme inclining more or less rapidly toward the stream. The Gila traverses a marvelously fertile country, very great in extent, and splendidly adapted to the cultivation of nearly all the products of the temperate and semitropic zones, besides many of the fruits common in the tropics. Nor is this longer a matter of idle speculation, for flourishing ranches in various portions of the valley, drawing water from several important canals, amply demonstrate the magnificent results that will ensue should the water supply be rendered permanent, equable, and adequate through appropriate storage systems.

The following, taken from that excellent work, The Handbook to Arizona, by R. J. Hinton, alluding to the valley in question, is interesting and accurate:

"This consists of a broad expanse of tillable valley land, sometimes overflowed by the river, which is at times 'mighty uncertain,' and a steep range of volcanic

hills coming close to the highways, for a dozen miles or so, hot, heavy, sandy. It is hardly fair to say sandy as it is really a friable alluvial soil of grayish hue and loose texture. Several ranches are passed, showing that the Gila bottom is cultivated. With irrigation, every square mile of the Gila Valley is capable of producing prolific crops of grains and semitropical fruits, as well as cotton and sugar in great abundance. The river is able to furnish all the water needed and a good deal more. It would take no very great skill in engineering, and not a very large sum of money either, to construct reservoirs or lakes in which to receive and store the overflow. There are natural basins or dry lakes into which, by simple means, the water could be conveyed."

The lands situated in and about the Gila Valley may conveniently be classified as follows: (1) The bottom or overflow lands; (2) slightly higher valleys, lands subject to no overflow; (3) mesas or sloping uplands; (4) high but comparatively level plains; (5) mountains.

THE BOTTOM AND HIGHER LANDS.

The bottom lands, as well as those slightly higher, stretch along either side of the Gila and Colorado rivers for varying distances north and south, until they meet the more elevated mesas which rise from the valley. The bottoms lie directly along the river and are subject to inundation annually. Immediately following the subsidence of the waters the local Indians were in former times accustomed to plant corn, pumpkins, melons, and other vegetables. These spring into maturity with startling rapidity, rarely failing to yield bountifully without additional irrigation. The custom is occasionally followed by resident farmers to this day, with excellent results, although but a single crop can be harvested. These bottoms form perhaps 25 per cent of the valley lands, and may without difficulty be secured from further invasion by a system of dikes and levees, if deemed necessary or desirable. The soil throughout the valley is a rich brownish yellow sandy loam, generous, mellow, porous, with a depth ranging from 6 to 20 feet, the whole resting upon underlying strata of gravel and sand that readily carry from the surface such excess of water as might otherwise prove injurious to seeds and growing plants.

Concerning the geological formation of these lands, the following from the report of the citizens' executive committee is sufficiently comprehensive:

"There is unmistakable geologic evidence that all this land during some prehistoric period was covered with water, constituting in fact an enormous lake, the surfaces rising in places to the upper portion of the outskirting mesas. The soil lying at the bottom was made by the washing and erosion of the surrounding mountains. The soda from the decomposed vegetation, the magnesia and lime from the magnesium-lime formations, and the potash from the decomposing granite rocks were carried with unceasing regularity year by year, until deposited in the bottom. Eventually upon the disappearance of the lake, the rich fertile alluvium, than which there is none better, was left to reward the efforts of the modern husbandmen. But nature, not yet satisfied with her handiwork, directed the accumulation of the detritus washed from the distant mountainous region. As a result, the soil is extremely rich in the elements best adapted to thorough fertilization, for it contains a certain amount of organic matter which, on decomposing, further enhances its agricultural value. By constant overflow and change of channel the deposits are evenly distributed over considerable areas, the process continuing through centuries. These soils are further enriched by decomposed organic contributions, including the sandstones, marls, limestones, shales, etc. Besides the ingredients mentioned, a chemical analysis shows that iron, ammonia, and phosphoric acid enter into its composition in the proportions best adapted to add to its productive qualities. The extremes of temperature are somewhat greater than on the highlands, but there is also more moisture.

"The bottom lands are so easily cultivated that it is not uncommon, after clearing the surface from the brush and stubble, to pass over the ground with an ordinary cultivator a single time, afterwards sowing to grain and grass. In three or four months large crops are harvested, the soil meanwhile being entirely innocent of the plow. All plants seem to grow rapidly, maturing remarkably early. Indications of ancient ditches are apparent throughout the valley, showing plainly the existence of irrigation works by the ancient Aztecs. Curiously enough, in certain instances, the identical routes of these long extinct people have been followed for considerable distances by their modern successors."

THE MESAS.

The mesas are warmer and better adapted to the cultivation of citrus fruits. The soil is also somewhat different, being of a reddish color, loose enough to receive

water without causing the ground to bake, and, while of a loamy nature, is more sandy or gravelly. It is in addition lighter, but therefore better adapted for the raising of figs, the olive, and the various kinds of wine grapes. Indeed, it has been asserted by several of the experienced wine growers of California that these very mesas are better calculated for the production of the true port and sherry grapes than any other of the lands within the borders of their own grand State. It is claimed that wine can be made possessing great preserving qualities, such as would allow improvement year by year instead of deterioration. These lands are greater in area than those directly upon the river, and almost imperceptibly slope away from the distant mountains. The drainage is admirable, not too excessive, and just sufficient to carry off surplus water. Vegetables, grasses, grains, sugar beets, cane, cotton, and in truth almost everything can be successfully raised.

HIGH PLAINS.

These include extensive bodies of land connecting with the mesas along the south side of the Gila River Valley. So gradual is the slope that they hardly deviate from the horizontal. At the highest points southward they gently incline toward the Mexican line, the slope in this case being directly opposite to that along its northern bank. In the latter instance it is first toward the mesas, and from thence indirectly to the river. The soil is very similar to that of the mesas, the two classes exhibiting common characteristics. Like the mesas, these plains are susceptible of the highest cultivation, providing always that ample irrigation facilities are afforded. Here and there they are crossed arbitrarily by mountain ranges, which do not all tend in the same direction, but they present no important engineering obstacles to the canal builder.

The wonderful fertility of the bottoms and other valley lands, as well as the mesas and plains, is established beyond denial by actual experiment. Neither is the soil likely to degenerate in the future, for, in answer to the question, "Will it last?" O. D. Wheeler, D.D., LL.D., a recognized expert in such matters upon the Pacific coast, says:

"To this query the answer in general is, the longer lands are properly cultivated and properly fertilized the stronger and more productive they become. While the mountains surrounding the valley continue to disintegrate under the operation of the elements, and while the detritus thus eliminated continues under the laws of gravitation to descend and work its way over the plains, so long will there be perennial additions to the amount of producing element in a state of refinement and assimilation. And so long as the water flowing from these mountains, holding in solution the débris which always in some degree is spread upon the land in irrigation, so long will the fertilizing properties of the soil continue to receive additions and its fecundic power continue to be increased; and so long as the water containing more or less of salts and ammoniacal compounds, as all water does, is used for irrigating purposes and so long as the process of cultivation continues to throw up the soil, exposing it to the indispensable and ever fructifying influence of the atmosphere, so long will the soil continue to be refreshed and invigorated and prepared to give large rewards to the labor of the husbandman."

THE VALLEYS OF THE COLORADO.

Concerning these we print the following, taken from the report of the citizen's committee of Yuma County, which report has already been referred to:

"Several miles above Yuma, in the neighborhood of Explorer's Pass, near the Purple Hills, the great Colorado River Valley proper commences. From this point northerly the river is shut in by cliffs which, with intervening mountain systems, absolutely preclude the possibility of canal construction. Passing southward, the cliffs are seen to gradually disappear until they become merged in the low bottom lands. The bottom meanwhile widens with every mile until the Gulf of California is reached. There are large quantities of land which could be made productive were irrigation practicable. These are generally fertile bottoms inclining toward the river and covered in spots with dense undergrowth and cottonwood and mesquite trees. Considerable of the valley is raised above the river as much as 100 feet, and to this height water must be brought, as the bottoms are during certain months completely overflowed by the waters of the swollen streams. The soil is extraordinarily rich and particularly adapted to the cultivation of sugar, rice, and all the textile plants, in addition to an extended list of tropical, semitropical, and temperate products. According to a careful chemical analysis, the fertilizing mud carried by the Colorado closely resembles that of the waters of the Nile, while its volume at low water has been estimated by competent authority as sufficient to easily irrigate more than 1,750,000 acres."

The lands of the lower Colorado River Valley have not been developed very extensively, owing to the litigation over what is known as the Algodones land grant, which has been in the courts for the last decade. The vexed question has lately been settled by the Supreme Court.

YUMA HEIGHTS.

One of the most promising developments in the vicinity of Yuma is that of the Yuma Heights fruit ranch of the Yuma Light and Water Company, located on the almost frostless mesa lands adjoining the town on the south, who have 130 acres planted to oranges, lemons, grape fruit, limes, bananas, cocoa nuts, dates, apricots, plums, prunes, blackberries, and strawberries, all of which are making a truly tropical growth. Strawberries bear practically all the year round, while the other fruits have their regular season for ripening. Apricots ripen about April 12, and the Sweetwater variety of grapes on June 1, when watermelons are also ripe. Melons are shipped in carload lots to points from Tucson, Ariz., to San Francisco, Cal., there being no competing melons between these points. Apricots and grapes are shipped all over California, Arizona, New Mexico, Texas, and Colorado, no section in the above-named States producing such early fruits.

Of all the above-named varities of fruit, the orange, lemon, and lime seem the most at home in this hot, dry climate. Scale is unknown, and will probably never thrive in the vicinity of Yuma, where a fog or dew is a curiosity.

The soil of the mesa lands above referred to was a very sandy loam when the ranch was started less than four years ago, but during that time the muddy water of the Colorado River, which is pumped to the heights by a powerful steam pump on the bank of the river in the town of Yuma, has changed it to a rich, sandy loam—an ideal fruit soil, which is improving every year. The fertilizing elements in the water used on each acre of land are worth fully $12 per year—a sum almost sufficient to pay for pumping the water 80 feet higher with which to irrigate.

Orange avenue connects the fruit ranch with the town of Yuma, and it is kept in fine condition. It is an ideal driving or bicycle road, and is much made use of by visitors and residents of Yuma. Orange and pepper trees are used for shade and ornament, and beautiful residences are being built on the avenue.

THE CIBOLA VALLEY.

Among the recent enterprises and developments in this county is the construction and operation of the Cibola Canal. Cibola Valley—so called by the original projectors of the enterprise, after the name of the Zuni villages of the sixteenth century—contains 25,000 acres of as fertile, irrigable land as there is under the sun; 5,000 acres susceptible to annual overflow from the silt-laden Colorado, and 5,000 acres too high to be watered by gravity, making 35,000 acres in all, the major portion of which is now beginning to blossom as the rose.

A colony of California agriculturists have recently become interested in the Cibola Valley, and have commenced the work of building homes there. They will plant beet fields, orange groves, vineyards, and orchards of deciduous fruits.

This land lies, as the crow flies, 50 miles north of Yuma, 86 by river or wagon road, on the Arizona side, and 60 by the more direct route to Picacho on the California side, and from thence on the Arizona side to the valley. The land is fertile beyond comparison with any but the land of the Colorado River, and will bountifully yield of any crops suited to the climate of Yuma County, including all of those of the south temperate zone, and many of those of the semitropic belt. For agricultural purposes the section is unsurpassed, for the cereal and hay crops, wheat, oats, barley, corn, sorghum, alfalfa, etc., are here in their element.

A little more than two years ago the preliminary survey was made and the feasibility of the proposition demonstrated. Since then the details have been perfected; men seeking location and profitable, safe investment have interested themselves and assisted in the proposition. The canal is 16 miles in length, 12 feet wide at the bottom and 4 feet in depth after it gets out on to the land. A heading has been secured where quicksand does not trouble, and one of the greatest obstacles to taking out gravity canals from the Colorado is avoided. The headgate has already stood the test of the high water.

The climate of Cibola Valley is all that can be said of the section immediately surrounding Yuma. The world's peerless climate for nine months in the year, it is not dangerously warm in the summer. The dryness of the atmosphere renders sunstroke unheard of. Small game is in abundance, while the lagunas during the cooler months teem with ducks and geese, and the hills adjacent contain deer and mountain sheep.

MINES AND MINING.

There is no section of the United States, or probably of the earth, more rich in mineral wealth than the county of Yuma. All the country north, east, and south of Yuma lies directly within the main gold belt that commences in Alaska and ends in Mexico.

From the San Bernardino Mountains in California to the Sonora boundary line the mountains and hills are exceptionally rich in the precious metal, as though demonstrating the theory often advanced that the richest gold mines are found bordering the beds of extinct oceans. The great Colorado Desert was once an inland sea, cut off centuries and perhaps ages ago from the main ocean, leaving its waters to evaporate in this intense heat. Throughout all the country bordering the desert, including this section, rich mines are being discovered, and some of recent location are already producing profits. In this neighborhood claims exceedingly rich are being located, and all signs portend a great mining boom for this county. It seems wonderful to believe that all this mineral wealth has been lying at our very doors for so many years without a taker; but the tendency of prospectors is to go a long distance off into strange lands, rather than to seek for mines in a county as old as Yuma and so accessible. The greater the distance, the hardship, and the danger the greater the fascination for the prospector. Distance seems indeed to "lend enchantment."

So it is that this county is almost a virgin field for the mine hunter, and now, with a few hundreds searching in its mountains, its mineral secrets are still in effect secrets, for thousands upon thousands might be wandering through the rock-ribbed fastnesses of our mountain ranges and their presence be unknown almost, so vast is the extent of the county.

La Fortuna mine, near Yuma, has largely added to the list of valuable gold properties in the Territory. It is also a prominent example of the fact that the gold-bearing regions of Arizona have been greatly neglected and not well prospected nor developed.

The mines and mill of this company are situated about 30 miles southeast of Yuma, in Yuma County. It is in a region without a natural supply of water, but capital and skill have remedied this defect by pumping water from the Gila River at a point 12 miles north of the mine. A large and powerful pump, requiring 100 horsepower, is placed at the river and the water is forced through a 4-inch pipe to the mill at the mine, overcoming an elevation of 750 feet. The difficulty of working a mine and mill without water is thus overcome and the supply is unfailing. A 100-ton cyanide plant has recently been installed, making the average output of the mine about $60,000 per month. There are also upon this property, and within less than 2,000 feet of the Fortuna, four other distinct and well-defined ledges, one 10 inches wide, one 2 feet wide, one 4 feet wide, and one averaging 12 feet wide. The assay value of the ores from these ledges averages, respectively, $20, $25, $8, and $12 per ton. The several shafts or pits sunk on these ledges amount in all to about 375 feet and the drifting to 320 feet. All this drifting and sinking is on ore, and from the prospects it would appear that these ledges will develop into extensive and valuable mines, comparable with the Fortuna. Work is progressing upon all.

Thus in a few short months this place (Fortuna) has developed from a desert and wilderness into a prosperous and growing camp, and intelligent and legitimate mining, with sufficient capital, is having its golden reward.

The King of Arizona gold mine is a recent discovery, and vast preparations are going forward to work the mine on an extensive scale. The richness of the mine is fabulous, the ore having assayed as high as $3,200 per ton. Owing to a scarcity of water this mine has not been worked before now, but an abundance of water has recently been discovered at a depth of 400 feet about 4 miles from the mine. There is 80 feet of water in the well and it is now being pumped up to the mine. A crushing mill, a cyanide plant, and much other modern mining machinery is being installed. The discovery of water near the mine will accentuate prospecting in the district, which is computed to be one of the richest in the world.

The Castle Dome lead mines are being worked successfully and new machinery has lately been installed there. New developments and discoveries are constantly being made in the Copper Mountain district. New locations are being made in every portion of the county, and the mining outlook was never brighter.

PRODUCTS.

Fruit culture has so far been prosecuted upon a somewhat limited scale, but enough has been learned from experimental tests to demonstrate the positive

feasibility of not only producing an excellent quality of the most profitable fruits, but also the ability to raise them for market from three to six weeks earlier than any section of California.

Concerning the various products of the county, we quote again from the report of the citizens' committee:

"The orange, lemon, and lime finding soils and climate congenial, yield in abundance large, clean-skinned, and exceedingly luscious fruits. They color handsomely, contain the requisite acidity and sweetness, and are very juicy. The fig and pomegranate offer a character of fruit that almost stamp them as indigenous. The latter is not yet recognized to any great extent, but it will certainly become an important factor in arboriculture when its economic qualities are better known. As to the fig, the most desirable variety has yet to be determined. The true White Smyrna would probably prove the best, and that its yield would be prodigious goes without saying, for the trees will bear three crops annually. This assertion is based upon actual productive results of the Mediterranean white fig that is known not to be the true Smyrna.

"The grape seizes upon what is proffered to it, and becomes hardy, thrifty, and adaptable. The choice naturally inclines to the earliest for table purposes. What those varieties should be is in process of experiment upon a scale that will soon solve the question, but it may be said that all kinds mature from three to four weeks before they do in California. They attain great size, cluster tightly in bunches, are firm and highly colored, and possess exquisite flavor.

"Heavy wines and brandies of an excellent character can be made; but with light wines the reverse is true, for everything apparently goes to saccharine. For ripening wines the climatic conditions are admirable. A quantity of common white wine, costing 45 cents per gallon, was brought here from California by water years ago, and being found unsaleable, was placed in cellars and its history almost forgotten. Nine years later the wine was brought to light, when it was discovered that it resembled a brown sherry, rich in bouquet, smooth as oil, and delicious to the taste. It was carefully drawn from the casks, bottled, and sold at $2.50 per bottle.

"The olive grows luxuriantly, and will in the future become a most profitable investment. Whatever its characteristics are elsewhere, here it requires water and cultivation—the more water the better. The mulberry matures rapidly, and when firmly rooted vigorously withstands great heat and lack of water. It produces an early, large, and sweet fruit, and is a highly desirable tree to plant along the canals for its grateful shade. The plum can easily be raised from seed. It fruits early, though so far the product does not commend itself particularly for table use; but as a stock upon which to graft prunes, or even superior varieties of plums, it is everything to be desired. An experiment in this line with the best prune known in California showed a growth of 23 inches in forty days from the insertion of the graft. The date has passed beyond conjecture. The plant produces magnificently, and its cultivation will be prosecuted more extensively this winter than ever before. The soil is in every way suitable and with occasional cultivation and intelligent irrigation a quick and early growth is assured. Apricots and peaches have been tested. They mature rapidly, bear choice fruit, and are always healthy, giving flattering indications of future success.

"As facilities increase, other fruit trees will be introduced, and with the same care that is bestowed upon them elsewhere will, so soon as they become acclimated, come to a yield materially in advance of the place from whence they come. The field is too large to admit of extended comment at this time, but it may suffice to briefly refer to certain other products which may in time equal, if not surpass, fruit growing as a commercial proposition, as, for example, cotton, wild hemp, ramie, sugar, sugar beets, etc.

"Cotton has been tried from time to time for years, with varying, but always satisfactory results, and even then without care. If watered regularly, it becomes a large bush, and if properly pruned, a tree, being in flower, boll, and cotton the year round. These bushes and trees have in instances borne steadily for fourteen years, the staple of course diminishing in course of time; but at ten years it is not inferior to the average staple of western India.

"Wild hemp is a textile plant indigenous to the country. It grows freely and luxuriantly to a great height, often averaging from 15 to 17 feet. It has a long strong fiber, and is frequently worked into nets and fishing lines by the Yuma Indians. Convulsive attempts have been made to utilize this plant, with the practical result of fixing its value among the fibers used in the manufacture of cordage at about $160 per ton of 2,000 pounds. After proper bleaching and manipulation a beautiful fiber has been produced and manufactured into colored fabrics, taking the dye and retaining the elasticity and luster exactly as well as

the fabrics of true flax and ramie. It seeds itself annually, and, immediately following the overflows of the Colorado River, takes possession of every nook, corner, and open area, to the exclusion of everything else. It covers not less than 100 square miles in an unbroken stretch, commencing near the boundary line of the Gadsden purchase and extending southward along the river to Hardy's Colorado, below the point where the rising tides of the Gulf of California force back the flow of the Colorado River proper.

"The fibrous plant ramie has been given a partial trial. The soil on analysis was found to contain all the essential properties to render the most favorable results; but the absence of water, together with injudiciously planting the roots too late, retarded the growth. Enough data has been obtained, however, to warrant the belief that this will eventually become one of our most important industries.

"Sugar cane has been fairly tested with the Sonora cane. The growth was surprisingly great, and the percentage of juice much increased over the yield at the place from which it was originally brought. A superior quality of pianoche and sirup were manufactured, the price realized leaving handsome margins for profit. The capriciousness of the water supply, as in the case of ramie, dissolved the industry, and it has not since been revived.

"The sugar beet promises better results for the future than many of the products already mentioned as prominent in the same direction. Samples not fully matured polarized 17 per cent. With proper cultivation, the percentage can be raised to from 20 to 25, and besides will harvest two crops each year.

"Wheat does splendidly, but complete data are not at hand from which to compute the average yield. In one instance, however, 488 pounds seeded to 20 acres, about 9 miles east of Yuma, on the Gila River, returned 52,750 pounds after having been irrigated five times. This was sold in San Francisco, bringing 50 per cent over every other kind then in the market. The grain is remarkable for its plump, berry-like appearance. The winter and spring are warm enough to insure a vigorous growth, and cool enough in April and May to allow the heads to fill out without shriveling. It is so perfect as to sell for seed, and, so far as is known, is proof against rust. The crops are raised annually.

"Barley also does well, and will produce two crops, the first yielding from 35 to 40 bushels of barley and the second a large amount of hay.

"Corn is produced in great quantity; yields enormously, and can be grown the year round. The Cocopah corn is noted for sweetness, plumpness, earliness, and for its firm and solid grains. Five weeks after planting, roasting ears are plentiful. This variety commands a ready sale at higher prices than any other kind.

"Alfalfa will cut from five to seven times at an average of 2½ tons to the acre. Eight acres but 1 year old have this year yielded 74 tons, with more cuttings yet to be made. The hay brings $15 per ton.

"Sorghum raised for feed is both valuable and prolific, it frequently reaching 15 feet high, and is worth $15 per ton, yielding 15 to 20 tons per acre. Several crops can be harvested annually.

"Vegetables, kitchen and garden stuff, melons, etc., grow all the year round in unlimited quantity and excellent quality. Some time since a Gila Valley farmer planted 15 pounds of Irish potatoes on a piece of bottom land that had been overflowed, from which he harvested over 700 pounds, and this record, it is believed, has rarely, if ever, been excelled. The sweet potato produces enormously, and equals the choicest brought from South Carolina.

"Peanuts mature rapidly and abundantly, yeielding a nut both plump and toothsome.

"Whenever there is sufficient moisture, the natural flora abound in profusion and variety. They are of rare beauty and delicious fragrance, the bulbous plants particularly. The lily surpasses the famous imported Japan. It has been claimed by experts that at no distant period opium will be manufactured from the poppy, and attar from the rose, both flowers thriving vigorously. There are but few trees and shrubs capable of adorning the surroundings of a lovely modern home that can not be satisfactorily grown.

"Every plant, vine, or tree mentioned in the foregoing list has been actually proven adaptable to our soils and climate. Many others have been omitted through lack of space, but there seems no doubt that time will demonstrate our ability to profitably raise all the semitropic and most of the tropical and temperate productions."

CONCLUSION.

In the valleys of the Colorado and Gila rivers there is room for thousands. It is not too much to say that nowhere within the limits of this broad Union can be

TOWN OF FLAGSTAFF.

UNIV OF

WILLIAMS, COCONINO COUNTY.

found a more desirable region for the making of a home. No laborious cleaning of the land is required; it lies almost ready for the plow. Trees and shrubbery have so rapid a growth that within eighteen months the immigrant can surround his abode with attractions which would require years to mature in less favored climates. Fruits ripen and are ready for market a full month before the California product. The bright sunshine makes life a luxury, and the pure dry atmosphere brings health to all who inhale it. For the establishment of colonies, such as are made in southern California, Arizona presents unrivaled opportunities. Thousands of acres now profitless can be made productive by the construction of irrigating ditches, and there is no investment which assures larger or more permanent returns.

Assessed valuation of property in Yuma County.

Cultivated land (19,941 acres)	$59,351.14
Improvements	11,733.00
Uncultivated land (14,578 acres)	15,044.65
Improvements	1,225.00
Patented mines (18)	2,550.00
Improvements	70,170.00
City and town lots (859)	63,064.00
Improvements	73,035.00
Horses:	
Range (138)	1,689.00
Work (423)	10,998.00
Saddle (24)	444.00
Stallion (1)	30.00
Mules (44)	1,100.00
Asses (13)	87.00
Cattle, Range (882)	8,820.00
Milch cows (86)	1,765.00
Bulls (14)	180.00
Swine (569)	1,422.50
Railroad, Standard gauge (82.5 miles)	502,539.55
All other property	77,230.50
Total	902,478.34

COCONINO COUNTY.

County seat, Flagstaff.

County officers.—Supervisors, J. C. Phelan, J. B. Jones, C. A. Greenlaw; sheriff, James A. Johnson; district attorney, James Loy; probate judge, N. G. Layton; recorder, T. E. Pulliam; treasurer, George Hoxworth; clerk board of supervisors, T. E. Pulliam.

Coconino County includes within her boundaries a large part of the natural scenery of Arizona. The immense plateau extends from the northern boundary line across the Grand Canyon and south to the south line of the county, upon which is the largest belt of pine timber in the Southwest.

The summer climate and scenery are a wealth within themselves enjoyed by no other locality in America. Hundreds of visitors are now taking advantage of our climate during the summer months, and many from the far East are now coming here for the benefit of the curative properties of our dry and healthful atmosphere.

In the past two years every line of business has made giant strides of progress. At Flagstaff, the county seat, renewed activity is seen among the commercial men. New buildings—handsome ones of brick and stone—have taken the places of vacant lots, and others remodeled to supply the increasing demand for more room in which to conduct the growing business of the place. At Williams a similar condition of affairs is found.

The disadvantages attendant on sheep grazing in the past few years have been overcome, and now the splendid ranges of this county are fully stocked with sheep. The stockmen are prosperous and much revenue is annually paid into the county from this important industry.

The area of lands under cultivation has materially increased. The products of the rancher are fast assuming important proportions. The soil in the valleys is rich, and as fast as ranchers find the best means of treatment for it under our climatic conditions, these lands become invaluable. Instead of the primitive homes that at first were built, now may be seen model well-furnished homes, where the ranchers dwell in comparative comfort.

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Mill and Kiln Facilities of Arizona Lumber Company, Flagstaff.

the fabrics of true flax and ramie. It seeds itself annually, and, immediately following the overflows of the Colorado River, takes possession of every nook, corner, and open area, to the exclusion of everything else. It covers not less than 100 square miles in an unbroken stretch, commencing near the boundary line of the Gadsden purchase and extending southward along the river to Hardy's Colorado, below the point where the rising tides of the Gulf of California force back the flow of the Colorado River proper.

"The fibrous plant ramie has been given a partial trial. The soil on analysis was found to contain all the essential properties to render the most favorable results; but the absence of water, together with injudiciously planting the roots too late, retarded the growth. Enough data has been obtained, however, to warrant the belief that this will eventually become one of our most important industries.

"Sugar cane has been fairly tested with the Sonora cane. The growth was surprisingly great, and the percentage of juice much increased over the yield at the place from which it was originally brought. A superior quality of pianoche and sirup were manufactured, the price realized leaving handsome margins for profit. The capriciousness of the water supply, as in the case of ramie, dissolved the industry, and it has not since been revived.

"The sugar beet promises better results for the future than many of the products already mentioned as prominent in the same direction, Samples not fully matured polarized 17 per cent. With proper cultivation, the percentage can be raised to from 20 to 25, and besides will harvest two crops each year.

"Wheat does splendidly, but complete data are not at hand from which to compute the average yield. In one instance, however, 488 pounds seeded to 20 acres, about 9 miles east of Yuma, on the Gila River, returned 52,750 pounds after having been irrigated five times. This was sold in San Francisco, bringing 50 per cent over every other kind then in the market. The grain is remarkable for its plump, berry-like appearance. The winter and spring are warm enough to insure a vigorous growth, and cool enough in April and May to allow the heads to fill out without shriveling. It is so perfect as to sell for seed, and, so far as is known, is proof against rust. The crops are raised annually.

"Barley also does well, and will produce two crops, the first yielding from 35 to 40 bushels of barley and the second a large amount of hay.

"Corn is produced in great quantity; yields enormously, and can be grown the year round. The Cocopah corn is noted for sweetness, plumpness, earliness, and for its firm and solid grains. Five weeks after planting, roasting ears are plentiful. This variety commands a ready sale at higher prices than any other kind.

"Alfalfa will cut from five to seven times at an average of 2½ tons to the acre. Eight acres but 1 year old have this year yielded 74 tons, with more cuttings yet to be made. The hay brings $15 per ton.

"Sorghum raised for feed is both valuable and prolific, it frequently reaching 15 feet high, and is worth $15 per ton, yielding 15 to 20 tons per acre. Several crops can be harvested annually.

"Vegetables, kitchen and garden stuff, melons, etc., grow all the year round in unlimited quantity and excellent quality. Some time since a Gila Valley farmer planted 15 pounds of Irish potatoes on a piece of bottom land that had been overflowed, from which he harvested over 700 pounds, and this record, it is believed, has rarely, if ever, been excelled. The sweet potato produces enormously, and equals the choicest brought from South Carolina.

"Peanuts mature rapidly and abundantly, yeielding a nut both plump and toothsome.

"Whenever there is sufficient moisture, the natural flora abound in profusion and variety. They are of rare beauty and delicious fragrance, the bulbous plants particularly. The lily surpasses the famous imported Japan. It has been claimed by experts that at no distant period opium will be manufactured from the poppy, and attar from the rose, both flowers thriving vigorously. There are but few trees and shrubs capable of adorning the surroundings of a lovely modern home that can not be satisfactorily grown.

"Every plant, vine, or tree mentioned in the foregoing list has been actually proven adaptable to our soils and climate. Many others have been omitted through lack of space, but there seems no doubt that time will demonstrate our ability to profitably raise all the semitropic and most of the tropical and temperate productions."

CONCLUSION.

In the valleys of the Colorado and Gila rivers there is room for thousands. It is not too much to say that nowhere within the limits of this broad Union can be

TOWN OF FLAGSTAFF.

UNIV OF

WILLIAMS, COCONINO COUNTY.

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MILL AND BOX FACTORY OF ARIZONA LUMBER COMPANY, FLAGSTAFF.

MILLS OF THE ARIZONA LUMBER COMPANY, FLAGSTAFF.

Cattle, range (15,423)	$159,628.05
Milch cows (204)	5,100.00
Sheep (164,000)	328,000.00
Goats (901)	1,802.00
Swine (201)	1,005.00
Railroad, standard gauge (123.66 miles)	283,650.00
All other property	370,646.05
Total	1,876,338.41

PINAL COUNTY.

County seat, Florence.

County officers.—Supervisors, R. W. Kersy, George F. Cook, J. F. Meyhew; probate judge, L. C. Herr; district attorney, W. R. Stone; sheriff, W. C. Truman; treasurer, W. Y. Price; recorder, F. A. Chamberlin; surveyor, W. H. Merritt.

Pinal County has a full share in the general prosperity which the year 1899 appears to have brought to every section of Arizona. Every industry has made substantial progress. In mining, particularly, the year is notable for the profitable development witnessed. All kinds of live stock have done well, and while farmers have had to face, as usual, an unfortunate shortage in the supply of water for irrigation, they are realizing good prices for their products.

Pinal County was organized in 1875 from portions of Pima, Maricopa, and Yavapai counties, and contains an area of 5,338 square miles, or 3,435,520 acres. One-third of this acreage is fine agricultural land, and is admirably situated for irrigation where there is sufficient water available.

The Gila River flows through the county, and at certain seasons of the year carries sufficient water in flood to irrigate a goodly portion of the county the year round, could the floods be stored for use as needed. Of late years the shortage of water has become more acute on account of the rapid development of irrigation higher up the river, in Graham County; and in consequence of the inroads made upon the water supply by the Graham County irrigators, Pinal has had to take third place among the agricultural counties of the Territory, yielding second place to Graham. The principal irrigating canals are: The Casa Grande Valley Canal, which takes its supply from the Gila, 11 miles east of Florence, and has a total length of 45 miles; the McLellan Canal, heading 9 miles east of Florence, with a length of 5 miles; the Spinas Canal, heading 3 miles west of Florence, and the Charlean Canal, 2 miles west, each with but few miles of length, and all supplied from the Gila. There are about 9,000 acres irrigated.

WATER STORAGE.

On account of the shortage in the water supply, the most interesting topic with the residents of the county is water storage. There are a number of reservoir sites on the Gila, at least one of which it is hoped will be utilized by the United States Government for the construction of a reservoir.

There is good ground for expecting that the General Government will build a dam at one of the sites, not because there is any popular faith in the theory that the Government will take up the construction of reservoirs as a policy to be carried out generally in the arid regions, but because it can be demonstrated that there would be a saving to the National Treasury as a result of the construction of a reservoir in this locality. Farther down on the river is the Gila River Indian Reservation, on which several thousand agricultural Indians are located. These Indians, from being self-supporting and independent, are finding it more difficult each year to raise anything at all, because the water formerly carried to the lands by the river is now taken out by the various canals in the upper valley. Repeated failures of crops are having the effect of making the Indians helpless wards of the Government at a heavy and increasing charge. The enormous expense of providing for the inhabitants of this reservation led the Government some four years ago to make an exhaustive investigation of the water problem. A point known as the "Buttes" was selected for the first investigation, with a view to determining the cost of constructing an adequate reservoir. That a great storage capacity could be developed by making the necessary expenditure was soon demonstrated.

Popular interest in the project grows out of the fact that the construction of reservoirs at the Buttes or elsewhere on the river will not only supply the Indians, but afford a large surplus of water for white settlers in the valley between the

reservoir and the reservation. The construction of the reservoir would cut off the annual and growing expenditure for the support of the Indians, and it is claimed that the sum thus saved yearly would more than pay the interest on the cost of construction. Not only that, but the surplus of water could be sold to settlers at such remunerative figures that the Government would find itself reaping a profit from the investment. The report of the preliminary investigation was so encouraging that Congress at its last session made an appropriation to continue and complete the investigation, with a special view to the location of bed rock at the various sites available for supplying the Indians with water for irrigation.

Following this appropriation, an active and exhaustive investigation of the problem has been carried forward throughout the spring and summer under some of the most competent engineers and hydrographers of the Geological Survey. Speaking of the work so far accomplished, Mr. J. B. Lippincott, the engineer in charge, said in a recent interview:

"The Gila River Indian Reservation is situated about 18 miles south of Phœnix and extends along the Gila River for a distance of nearly 50 miles. Here are located the Pima and Maricopa Indians, to the number of nearly 5,000. These Indians are known throughout the Territory as good Indians. They have always been peaceful in their habits and agricultural or pastoral in their pursuits. They are now cultivating the lands where the prehistoric races built the now ruined Casa Grande and its neighboring canals. Irrigation has been practiced in this valley from prehistoric times. Many ancient ditches can be traced across the plain, showing evidence of engineering skill and testifying to the fact that large volumes of water were at one time carried.

"The Pimas and Maricopas have been until recently a self-sustaining nation. They raise their crops of grain and corn with a skill equal to that of the whites. The settlers, seeing the results which the Indians have produced, through the operation of the desert-land act brought under cultivation much land in the valley of the Gila adjacent to this reservation, and have built extensive canals between Florence and the railroad station of Casa Grande. Under the provision of the United States law all land bought under the desert-land act must be made productive by the application of water. In order to comply with the provisions of this law the settler was compelled to make diversions from the Gila River at points from the Indian reservation. Other lands were taken up under similar condition on the upper portion of the Gila River. These diversions by the whites quickly deprived the Indians of their water supply, and for the past five years they have been left on the desert without water for their crops and scarcely enough for their horses. They are put in the position of either having to steal, starve, or to be fed as public wards, and the Government has been forced to issue rations to them and feed them as it does the soldiers. Numerous court decisions have been rendered establishing beyond controversy the fact that the Indian has the prior and the better right to the water, but the whites have maintained their water supply despite the dictates of the court. The development of this newer civilization has become so extensive that to cut off its water supply would mean the desolation of many thousands of acres of fine farms and orchards. Evidently the situation is a difficult one, and the Indian Bureau is hard pressed for a proper answer.

"In 1896 an allotment of $3,500 was made from the appropriation for the Indian Office for a preliminary investigation of the available water supply for these Indians. Mr. Newell was instructed to make this investigation by the Secretary of the Interior, and he delegated Arthur P. Davis to take the matter up in the field. The surveys were necessarily of a preliminary nature, but the storage possibility of the Gila River was fully demonstrated. It was shown that this stream drained about 15,000 square miles of the high plateau and mountain region of eastern Arizona, and that the river is remarkable for its exceedingly light grade.

"Consequently the storage possibilities of the stream are great. Recommendations were made by Mr. Davis calling for further and more accurate surveys, and in the spring of 1898 Congress passed a second appropriation of $20,000 for the completion of this investigation. The hydrographic department of the Geological Survey was again delegated as the proper office to conduct these surveys.

"The Gila River derives its source from the White Mountains in western New Mexico and eastern Arizona, which rise to elevations of from 10,000 to 12,000 feet. At the point where it issues from its mountainous basin there are over 12,000 square miles draining through its canyons. The basin has been extensively explored, and three large reservoir sites located and surveyed. The capacity of these reservoir sites has been determined, and filings have been made under the United States laws for their segregation from the public domain. At a point known as the Buttes a dam 150 feet in height above the bed of the stream will store enough water to cover 174,000 acres 1 foot deep, or, as it is technically

expressed, 174,000 acre-feet. A dam at this point would be approximately 30 feet long at the bed of the stream and 800 feet at its crest. At Riverside, Ariz., it was found that a dam 350 feet long at its base and approximately 800 feet long on top will store a much greater quantity of water, the surveys at this site being still incomplete. At San Carlos, on the Apache Reservation, the river passes through a narrow gorge 100 feet wide, and a dam at this point 150 feet high would be but 200 feet long at the crest. Such a dam would store 361,000 acres 1 foot deep.

"Extensive explorations have been made to determine the depth of bed rock at each one of these dam sites. At the Buttes the bed rock is disappointingly deep, the depths ranging in the center of the channel from 75 to 124 feet beneath the surface of the stream. At Riverside the maximum depth on the axis of the dam is approximately 75 feet, while at San Carlos the depth to bed rock is believed to be substantially less than at either of the other dam sites.

"The records of the flow of the Gila River have been kept at the Buttes for a number of years and the estimates of available water supply are therefore based on actual measurements and not on surmise. The ordinary flow of this stream is ample to fill the the largest of these reservoirs, and on the driest years of which we have a record it has been as great as 200,000 acre-feet.

"It will be seen by the above figures that the possibility of storing water on this stream is very great. It is doubtful if it has any equal in this line among all the streams of arid America. The San Carlos dam site, particularly, is one of unusual merit. The size of the necessary dam, the available water supply, the great storage basin, and the proximity of railroad facilities are perfect, while the other two sites also have features of merit.

"The duty of water in southern Arizona is greater than in California. For the raising of the staple crop of alfalfa a depth of 24 inches of water is ordinarily applied to the land, which is equivalent to a flow for six months of 1 miner's inch to each 8¼ acres. On this basis the San Carlos site will furnish enough water to irrigate over 150,000 acres of land. If it is assumed that each 2 acres will support one inhabitant, this would permit of a population of 75,000 souls to be sustained from this reservoir.

"These figures are more startling when the fact is realized that at the present time all of the canals below the San Carlos dam site are absolutely dry, and that the country from the Apache Reservation to the mouth of the Salt River is in a condition of withered drought, with its inhabitants, both white and Indian, reduced almost to the condition of abject want. It is estimated that 10,000 acres of land should be irrigated on the Gila River Reservation, in order to relieve the condition of the Indians. This would leave over 100,000 acres that could be irrigated on the public domain. If 100,000 acres of these public lands could be so irrigated and, being subdivided into 40-acre tracts, sold to actual settlers, at the rate of $10 to $15 per acre, the condition of the Indian would be wholly relieved, and it is probable the Government would be reimbursed for its entire outlay. In addition to this a district offering ideal conditions for irrigation, with a soil which is unexcelled, with a climate that will produce crops in continuous rotation, will be made to support a population of 75,000 and will add to the public wealth of the Territory, on a conservative estimate, over $6,000,000."

POPULATION.

The population of the county by the last census was 4,251, and it is not less than 5,500 at this time.

MINES AND MINING.

The silver mines of Pinal County being largely low-grade ore, the output of the white metal has been next to nothing for the past year, the present price being so low that they can not be worked with a profit. The Silver King is an exception, and work has been recently started up on this property, which has in time past paid over $2,000,000 in dividends to stockholders. In gold mining, however, there has been considerable activity at Mammoth, Goldfield, Mineral Creek, Ripsey, and other points, and the bullion output of gold for the year has been about $250,000. The principal mines of the county are the Silver King and Raymert (both silver and each with 20-stamp mills), the Ray (copper), and the following gold mines:

	Stamps.		Stamps.
Mammoth	50	Victoria, south of Casa Grande	10
Mammoth, at Goldfield	20	Mammon, south of Casa Grande	20
Mohawk, at Mammoth	50	Southern Belle, at Catalinas	20
Bulldog, at Goldfield	10	Norman, at Ripsey	20
Reksom, at Mineral Creek	5		

A small amount of placer gold has been taken out of the Catalinas and sold in Tucson. There is an evidence of awakening in all kinds of mining, and the prospects for the coming year are flattering.

CASA GRANDE RESERVOIR.

The reservoir of Casa Grande Valley Canal Company is the largest in the Territory. It is situated 15 miles southwest of Florence. A levee of earth has been thrown up across a depression in the plain 14,000 feet in length, 125 feet in width at the bottom, and 25 feet in width at the top, 2 to 1 slope on each side, and an average height of 25 feet. The waste is regulated by three cast-iron pipes 3 feet in diameter, set in solid masonry, regulated by gates and tower. This reservoir cost $150,000 and supplies water for 6,000 acres.

METEOROLOGICAL.

The Signal Service of the General Government maintained a station at Florence from 1874 to 1882. The report, covering a period from July, 1880, to April, 1882, gives the following statistics, which may be given as a safe guide for the prevailing temperature, which varies but little from the mean temperature given during the series of six years:

Month.	Mean.	Maximum.	Minimum.	Month.	Mean.	Maximum.	Minimum.
1880.	°	°	°	1881—Continued.	°	°	°
July	86.6	111	61	July	87.9	112	64
August	86.5	112	60	August	84.5	110	62
September	81	107	48	September	77.5	103	50
October	68	96	32	October	67.4	98	36
November	52.1	80	25	November	52.4	80	26
December	50.9	77	27	December	52.2	81	28
1881.				1882.			
January	45.7	78	21				
February	54.7	85	21	January	46.4	79	23
March	54.7	93	29	February	49.5	72	27
April	69.1	100	48	March	57.3	92	25
May	74.7	104	45	April	62.1	100	32
June	83.7	113	44				

The heat, as represented in the above table during the months of June, July, and August, is nothing like as unbearable as in the Eastern States, and death from sunstroke is unknown; in fact, during a residence of sixteen years in Arizona the writer has only known two people to be overcome by the heat, and they recovered. Their condition, however, was more the result of whisky than heat.

UNTOUCHED BY FROST.

Orange and lemon trees require slight protection during the winter for a year or two until the wood is sufficiently hardened. While it is a popular thing for one to say that he is not here for his "health," it is an undisputed fact that, for all pulmonary ailments, no climate is equal to southern Arizona, and there are numbers of active industrious citizens with but one lung who came here years ago expecting to live but a few weeks. But for all that, the wonderful Casa Grande Valley is something better than a health resort.

PRODUCTS.

The waters of the Gila River are fresh and pure. The soil contains no alkali, is a deep, rich, gray ash, especially adapted to the growth of prune, olive, almond, peach, fig, pear, apricot, and all fruits of all kinds, which pay largely on the investment. It is also the natural home of alfalfa, which grows in the most prolific manner. The grape does exceptionally well in this valley, and wine and raisin culture is destined to become a prominent industry. Citrus fruits have been cultivated to a limited extent. There are a number of orange trees in the neighborhood of Florence, which bear the golden fruit each year without protection, and a few date palms are also in full bearing. The season is from six weeks to two months earlier than southern California, which gives fruit growers an appreciated advantage in the early markets.

The absence of fogs and nightly dews is a formidable obstacle to the existence of the destructive and unsightly scale bug, and the fruits of the valleys are all bright and clean. All the agricultural products of the temperate and semitropic zones are easily grown here, and long seasons give succession of crops that double or treble the productive value of the land.

PRICE OF LAND.

Improved lands, with Government title and water right, can be bought for from $20 to $50 per acre, according to location and improvements. In the immediate neighborhood and to the south of the Casa Grande ruins there are thousands of acres, covered with a heavy growth of mesquite timber, yet open to settlement. These are among the choicest lands of the valley. Water in inexhaustible quantities is found at a depth of from 20 to 30 feet; in fact, a river seems to be flowing underneath. Here is a splendid opportunity to take up and improve land with a pumping system of irrigation, which is said to be successful on small tracts.

Assessed valuation of property in Pinal County.

Land (55,854 acres)	$364,709.50
Improvements	134,157.00
Patented mines (37)	39,500.00
Improvements	75,840.00
City and town lots	44,276.50
Improvements	56,285.00
Horses (2,095)	29,447.00
Mules (112)	2,800.00
Asses (96)	431.00
Cattle (23,213)	273,666.00
Sheep (4,034)	8,068.00
Swine (195)	585.00
Railroad, standard gauge (80.29 miles)	476,316.64
All other property	200,918.50
Total	1,707,000.14

GRAHAM COUNTY.

County seat, Solomonville.

County officers.—Supervisors, H. C. Day, D. H. Matthews, William R. Waddil; sheriff, Ben. R. Clark; treasurer, Burwell B. Adams; recorder, Pedro Michelena; probate judge, William A. Moody; district attorney, Wiley E. Jones; clerk board of supervisors, Pedro Michelena; surveyor, E. R. Stafford.

Graham County, in the southeastern part of the Territory, and almost the last spot to be wrested from the domain of the Apache, has, by reason of its mineral, agricultural, and pastoral resources, risen to a place of only second rank in the list of counties. Clifton, Morenci, and Metcalf are mining villages, and contain a population of 5,000, engaged in various occupations of mining.

Duncan, Solomonville, Safford, Thatcher, Central, Pima, Mathewsville, Fort Thomas, and Geronimo are agricultural villages, being located in the valley of the Gila, and all, with the exception of the first named, which is on the Arizona and New Mexico Railroad, are on the Gila Valley, Globe and Northern Railroad.

The river Gila, coming from its sources in New Mexico, enters the county near its center on the east, and, uniting with the San Francisco below Clifton, passes through the center of the county, leaving it at San Carlos on the west. The river valley is of rich alluvial soil, and is from 2 to 5 miles in width, much of which is under a high state of tillage by irrigation. The crops grown include those of the temperate zone and some semitropical fruits. Late apples are very productive and of excellent quality. Other fruits are of good quality, but are sometimes damaged by late frosts.

Prices of all farm products are very remunerative, owing to a local market in the mines near by. Wheat is $1.35 per cental (sacks returned to producers); barley, $1.25; Irish potatoes, 2½ cents per pound; apples, 3 cents per pound; hay, $8 to $12 per ton.

No portion of the county has a less elevation than 2,800 feet and varying to 10,000 feet for the mountain peaks. The climate is dry and healthful; winters in the valley are mild, the range of the thermometer being from 14° F. above zero to to 104°. Nights generally are cool and bracing in summer.

The mountain ranges are highly mineralized. The Arizona Copper Company at Clifton and the Detroit Copper Company at Morenci have each some of the most complete reduction works in the world, rich permanent ore deposits, millions invested in plants and railroads, and together employ a population of 5,000 people.

The Detroit Copper Company have just completed a plant for supplying their mines at Morenci, at a cost of $50,000, with water supply from Eagle Creek, 4½ miles distant. Eagle Creek at its lowest stage furnishes 30 cubic feet per second. At present the power used is a steam engine of 95-horsepower capacity, only 50 horsepower being required. The pipe line is 4-inch; length, 4½, miles; elevation of Morenci above point of supply, 1,625 feet. Seventy gallons per minute is now delivered at Morenci. The steam power is to be supplemented or substituted by a turbine water wheel, connected directly to the pump with 207 net horsepower.

The Arizona Copper Company are also at work on an electric plant at Eagle Creek, using a water wheel under 500 feet pressure, developing 1,200 horsepower. The power will be carried by wire to Coronado and their mines and used to run all hoisting works, train roads, concentrators, etc., thus doing away with steam power altogether. The estimated expense of the plant and dynamos is $45,000; cost of changes at mines and works not estimated. Since the so-called coal strip was cut off from the San Carlos Indian Reservation, about a year ago, prospecting has been very active in that locality, and one of the most promising mineral districts in the county is being opened. The principal ores are coppers; altogether other minerals abound. The coal deposits near by will soon be exploited and their value determined. They may give much additional value to all of our mineral properties. There are veins of precious metals in every mountain range in the county, and their extent can hardly be conjectured at the present. All of the towns show a marked and rapid growth during the last year. Brick blocks of modern architectural style, to accommodate the increasing business, go up; banks are established; manufacturing plants put in; school buildings constructed, with capacity to accommodate the increasing population, well furnished with modern seats and apparatus, and supplied with teachers who are graduates of the best State normal and high schools.

The county has 30 school districts. The teachers employed number 42. The average salary paid to teachers is $58.98 per month. There is a school district indebtedness, represented by 7 per cent bonds, apportioned as follows: To the Safford district, $5,500; Solomonville, $6,000; Thatcher, $4,500; total, $16,000. The number of school children shown by the census of 1899 is 2,995.

Turning to the farms, notable improvement has been made in the surroundings of the occupants. Fine brick residences are taking the place of the old log and adobe structures, shade trees are planted, yards are embellished with shrubbery and flowers, orchards are planted—demonstrating that our rural population is not behind in civilization.

The Graham Mountain range has quite a timber area, but owing to its precipitous character the lumber output is limited. In the northern part of the county is a large forest area not yet available, as it lies partly on the Indian reservation, with no road to it yet constructed. The range cattle interest is very important and ranks with any county in the Territory according to area. Near Fort Thomas is a hot mineral spring much frequented by invalids and possessed of good healing power, especially in rheumatic complaints. Fine mountain resorts abound, where the heat of summer may be avoided among picturesque scenery, being accessible in a few hours' travel. Successful agriculture can only be carried on in Graham County by irrigation.

The river Gila and its tributaries afford a moderate supply for their immediate valleys. There are 24 irrigating canals, varying in size from 5 to 12 feet in width and from 2 to 14 miles in length. They were all constructed and are now owned by the farmers, and are carried on under the cooperative system. The companies are mostly incorporated, and the cost of irrigating an acre is what the necessary annual cost of maintaining the canal may be pro rata per acre, say from 50 cents to $1.

There are approximately 45,000 acres of land actually under cultivation in this county, in the principal valley of the Gila.

Beginning at the easterly boundary of the county, near Duncan, the canals succeed each other every few miles, the fall of the stream and valley being favorable. This system is the outgrowth of the early settlement.

Each small community of farmers, when they settled, had to go to work first and secure a water supply according to their means, which were generally limited. This multiplicity of canals seems now unnecessary, but certain facts with reference to water supply justify it, and probably it will never be abandoned, for the reason that at the low stage of water, from April to July, a large part of the water

passing down the river is in subterranean streams and in springs rising in the river whose source is in the mountains bordering the streams.

The water comes to the surface between the dams, thus affording a new supply to the canal next below. The seepage from the irrigated lands above also largely swells the volume of water, as in the course of time it must all get back to the river, less the amount of evaporation. But this only applies to low water; the river at its ordinary stage runs a large surplus to waste, sufficient to irrigate every acre of available land in the county if conducted to it, during eight months of the year at least, making grain, fruit, and alfalfa crops possible and opening up the most healthful and picturesque portion of the county to settlement. To utilize the waste waters a large canal has been projected during the last year, designed to be built by the cooperative labor of the land owners.

This canal begins at the head of the principal valley, 8 miles above Solomonville and near where the Rio Bonito enters the Gila, and will run back into the mesa lands and be 36 miles long. A few miles of the head have been constructed. At the point it leaves the river it is in solid rock, securing permanence.

Artesian water has been developed on a small scale in different parts of the valley and at a depth of less than 200 feet. It is very probable that good supplies can be obtained from this source when the proper work shall be applied. This and a storage system should have the careful attention of the Government and its assistance whenever practicable.

Assessed valuation of property in Graham County.

Cultivated land (9,742 acres)	$156,839.25
Uncultivated land (29,968 acres)	227,942.10
Improvements	298,710.25
Patented mines (74)	214,990.00
Improvements on patented mines	349,017.00
Improvements on unpatented mines	2,625.00
City and town lots	54,541.00
Improvements	102,119.00
Horses:	
Range (499)	7,131.00
Work (1,275)	42,058.28
Saddle (1,924)	40,517.60
Mules (112)	2,872.27
Asses (262)	2,647.00
Cattle:	
Range (56,325)	563,250.00
Beef (20)	400.00
Milch cows (730)	14,613.00
Bull (1)	15.00
Sheep (1,231)	2,462.00
Goats (3,883)	7,766.00
wine (579)	1,737.00
Railroad, narrow gauge (41 miles)	128,246.80
All other property	275,162.73
Total	2,495,662.73

NAVAJO COUNTY.

County seat, Holbrook.

County officers.—Supervisors, L. E. Divelbess, John X. Hoods, John Hancock; sheriff, F. J. Wattron; probate judge, B. F. Jackson; district attorney, W. H. Burbage; recorder, A. F. McAllister; treasurer, J. H. Richards; clerk board of supervisors, A. F. McAllister.

Navajo County was created by an act of the eighteenth legislative assembly from the western portion of Apache County, and is situated in the northern and eastern portion of the Territory. On the north is the Colorado River, on the east Apache County, on the south Gila and Graham counties, and on the west the county of Coconino. The topography of the county consists of a high plateau, of which the main elevation is about 6,000 feet, cut from east to west by the Little Colorado River, sloping gently toward that stream and also toward the west, the general direction of the river. It is about 240 miles long from north to south and 53 miles wide from east to west, containing about 10,000 square miles. The Moqui and Navajo Indian reservations cover the entire northern

portion, and the White Mountain Apache Indian Reservation covers the southern part, leaving a strip 100 miles long and 53 miles wide for the occupation of white people.

The southern portion of the county is covered by a fine growth of pine, which is now embodied in the Black Mesa Forest Reserve. The population of the county is estimated at about 5,000.

HOLBROOK.

Holbrook is the county seat of Navajo county and has a population of about 800. It is one of the greatest shipping centers in northern Arizona. It is situated in the fertile valley of the Little Colorado, and has a bright future. Above the town is a fine site for a storage reservoir and when constructed it will reclaim several thousand acres of tillable land. Holbrook is also the distributing point for Snowflake, Taylor, Pinedale, Shumway, Linden, Showlow, Silver Creek, Pinetop, Woodland, Fort Apache, Heber, Pleasant Valley, Woodruff, Concho, St. Johns, Springerville, Keams Canyon, etc. Last spring over 10,000 head of cattle were shipped from this point, and 50,000 head of sheep, and several hundred thousand pounds of wool. All kinds of business are liberally represented in town. In 1898 a fine court-house was erected. The town has a graded school and a church building is in the course of construction. Four stages leave the town, two of which are daily.

WINSLOW.

Winslow is the largest town in the county and has a population of about 1,500. It is a freight and passenger division point on the Santa Fe Pacific Railroad. It has one of the finest railroad eating houses in the West; railroad shops, roundhouses, etc., and the company employs about 600 men at that point. The town is growing rapidly, and contains several fine business blocks and numerous elegant brick residences. An opera house is under construction. It contains several churches of various denominations, and a fine brick school building that will accommodate about 300 pupils.

Several farms have been cultivated profitably around Winslow for years by diverting the waters of Clear Creek upon the soil. A large irrigation scheme is now being developed, and when completed will reclaim about 50,000 acres of land surrounding the town. The town has a pushing, energetic population and its future prospects are flattering.

ST. JOSEPH.

St. Joseph is a thriving village situated on the Little Colorado, between Holbrook and Winslow. Its inhabitants depend chiefly on agriculture and stock raising. Wheat, barley, oats, corn, alfalfa, sorghum, all kinds of vegetables, and many varieties of fruits. Water for irrigation is taken from the Little Colorado in two ditches, one about 9 and the other about 5 miles long, each having several miles of laterals.

WOODRUFF.

Woodruff is another farming village situated 12 miles east-southeast from Holbrook on the Little Colorado River. Water is secured by damming the Little Colorado. All kinds of small grains and vegetables are raised. Alfalfa is a staple crop; and fruits, such as peaches, apples, pears, apricots, plums, and a variety of cherries, do well. The village is located at the foot of Woodruff Butte, a noted landmark in northern Arizona. The Butte is of volcanic origin and rears its solitary head 1,000 feet above the surrounding plain. It is one of the most picturesque towns in the county.

SNOWFLAKE.

Snowflake is situated 30 miles south of Holbrook, and is the second town, based on population, in the county. The town is substantially built, containing numerous fine brick residences and several substantial business houses. It is built in the center of a rich farming section. The cultivated lands adjacent to town are watered from storage reservoirs, impounding the waters of Silver Creek. The town is handsomely laid out; broad streets lined with tall shade trees, beautiful buildings, etc., combine to give an air of opulence and prosperity to the place. It is the most beautiful and most substantially built town in northern Arizona.

The lands surrounding the town are very fertile, producing all kinds of cereals, hay, vegetables, and various kinds of fruit. The town has a telegraph line, a daily stage, and every convenience of an inland town.

TAYLOR.

Taylor is situted about 3 miles above Snowflake, on Silver Creek. Like Snowflake, it depends wholly on the tilling of mother earth. The two towns depend on the same irrigation system, and there is now about 4,000 acres of tillable land under cultivation in and about the two towns. Two more irrigation systems are now being constructed, and in a year or so two or three times the present amount of land will be cultivated. The productions at Taylor are the same as around Snowflake. Taylor is pushing ahead and rapidly forging to the front as one of the live towns of the county.

SHOWLOW.

Showlow is located on Showlow Creek, about 18 miles south of Taylor. It is principally a farming community, yet some of the sheep owners of Navajo County reside there and own ranches in that section.

PINETOP.

Pinetop, Linden, Pinedale, and Herber are situated in the timber belt south and west of Showlow. They are also farming communities, while several sheep and cattle men reside there.

SHUMWAY.

Shumway is situated on Silver Creek, 7 miles southeast of Taylor. It is hemmed in by surrounding mountains and is a picturesque and beautiful spot. It contains a fine flouring mill, which supplies the surrounding country with flour. That vicinity is particularly adapted to fruit raising, and the most delicious varieties are produced at Shumway. In addition thereto all sorts of cereals, vegetables, and hay are raised.

IRRIGATION.

There are many thousand acres of the choicest kind of farming land in the county and plenty of water to irrigate the land with. It will require only a small outlay to build a number of storage reservoirs to impound the water of the streams, and make a vast agricultural section out of this county. There is a good demand for all kinds of produce. The soil, with the application of water by irrigation, will produce abundantly wheat, oats, corn, barley, rye, beans, potatoes, cabbage, peas, and all kinds of garden truck, besides apples, peaches, pears, plums, apricots, prunes, berries of all descriptions, and sugar beets. An investment in a few reservoirs will bring returns in a thousandfold. There are numerous fine reservoir sites, where nature has hollowed out places, and all that is required is to dam up the narrow outlets. A natural basin above Holbrook, if dammed up, will reclaim 100,000 acres of land; another above Showlow, one near Winslow, and, in fact, the county is dotted with natural reservoir sites. So far only 9,000 acres of land have been reclaimed in the county, and the agricultural industry is in its infancy. The soil is black loam, and sandy, gravelly clay, and is rich and fertile whenever water is applied.

The rainfalls in the latter part of the summer always send torrents of water down the streams, which, if impounded, would be of vast value to the agriculturist, fruit raiser, and stockman.

BEET SUGAR.

The soil is especially adapted to the cultivation of sugar beets. Actual experiments have demonstrated that beets can be raised here containing from 18 to 20 per cent of saccharine matter. Land once put in shape to cultivate beet sugar successfully is worth from $200 to $300 per acre.

TIMBER.

About one-third of the county is heavily timbered with pine, piñon, oak, and cedar. The pine makes fine lumber, and the other varieties make very desirable material for fencing and fuel. Coal can also be had for $7 to $8 per ton in any of the towns along the railroad.

RAILROADS.

The Santa Fe Pacific Railroad traverses the county centrally from East to West, a distance of over 53 miles. The main stations are Holbrook, St. Joseph, and Winslow.

AGRICULTURE.

Wheat, oats, and corn are the principal cereals raised. Wheat brings $1 per bushel, corn 60 to 75 cents per bushel, oats 50 to 60 cents per bushel. Alfalfa is another staple crop and brings from $7 to $15 per ton. Fruit and garden truck bring good returns.

LIVE STOCK.

Agriculture, cattle, and sheep raising are the three great industries of the county. There are now about 60,000 head of cattle in the county, 150,000 head of sheep, 8,000 horses, and 2,000 swine.

MINING.

Several prospects have been discovered, but no paying mines have been found as yet.

WEALTH.

The assessed valuation for 1899 was $1,211,058.19, which represents about three-eighths of the real value of the property in the county.

CLIMATE.

The mean elevation is between 5,000 and 6,000 feet above sea level. The climate is bracing and is an ideal retreat for pulmonary affections. The winters are mild and the altitude renders the summers comparatively cool. No extremes, but an even, moderate climate, suited to develop physical and mental activity. The snowfall during the winter is light, and the refreshing showers in the summer cool the atmosphere and temper the heat.

SCENERY AND NATURAL WONDERS.

Southeast of Holbrook is the world-famous Petrified Forest. To the north is the strange and weird Painted Desert, the Aztec ruins, the Moqui villages, where every year the snake dance, a remarkable religious ceremony, is held, and which attracts scientists and tourists from every part of the globe. To the south are the famous hunting and fishing grounds of the White Mountains.

EDUCATION.

There are 14 school districts in the county, employing 22 teachers. Five of the districts have graded schools, with two or more teachers. The number of months of school taught in each district range from 5 to 8, averaging about 6¼ months. The salaries paid range from $45 to $100 per month; average salary about $65 per month for both male and female teachers. There are about 1,000 children of school age in the county. The schools are in excellent condition, and the standard of the teachers is fully equal to the average in the East. Most of them are normal school graduates or have received professional training in normal schools.

PRESS.

Two papers are published in the county—the Mail, at Winslow, and the Argus, at Holbrook.

CHURCHES.

There are 8 churches in the county. Several denominations who have no church building of their own, but hold services in the public halls, schoolhouses, and in the meeting house of the denominations who are fortunate enough to have one.

DAIRY PRODUCTS.

Dairy products are increasing, but the supply does not go beyond home consumption. It could be vastly increased.

OTHER INDUSTRIES.

Almost all over the county along the Little Colorado good clay and sand suitable for brickmaking can be found. The brick manufactured at Holbrook and Winslow rival the famous Milwaukee product.

Fine building stone can be quarried along foothills of the Little Colorado. At Penzance, 6 miles below Holbrook, the Santa Fe Pacific Railroad Company is operating a large rock quarry, employing about 100 men. This product is shipped east and west along the whole system.

A good grade of gypsum, in inexhaustible quantities, is found in many places, which would, if properly treated, make cement equal to the best.

Tanneries, woolen mills, a wool scouring plant, etc., would be profitable investments.

Assessed valuation of property in Navajo County.

Land (315,388 acres)	$125,436.85
Improvements	38,267.10
Railroad land (721,109 acres)	144,221.71
City and town lots	87,463.83
Improvements	173,540.00
Horses:	
Range (1,366)	13,660.00
Work (568)	22,720.00
Saddle (265)	5,300.00
Stallions (8)	390.00
Mules (61)	1,995.00
Asses (78)	390.00
Cattle, range (8,737)	104,704.15
Milch cows (483)	9,772.00
Sheep (88,455)	176,910.00
Goats (530)	1,060.00
Swine (247)	1,113.00
Railroad, standard gauge (57.208 miles)	143,020.00
All other property	161,094.55
Total	1,211,058.19

APACHE COUNTY.

County seat, St. Johns.

County officers.—Supervisors, A. V. Gibbons, L. J. Brown, B. Lopez; sheriff, Edward Beeler; district attorney, Alfred Ruiz; county recorder, John T. Patterson; treasurer, Benjamin Schuster; clerk board of supervisors, John T. Patterson.

Apache County was named from the Apache Indians, who formerly occupied this section, and still occupy their reservation to the immediate southwest. The county is 48 miles from east to west and 115 miles north and south, exclusive of the Navajo Indian Reservation on the north, and lies in the northeast corner of the Territory. It has an average of about 5,600 feet altitude, and is traversed by the Rio Puerco, Zuni, and Little Colorado rivers, flowing, respectively, from the northeast, east, and southeast. The greatest elevation is in the south, the region of the spurs of the White Mountains. The surface is a series of broad valleys and table-lands.

WATER SUPPLY.

The White Mountains on the south, containing about 600 square miles, which slope gradually to the north, furnish a considerable supply of water. The July and August rains are copious, the streams often overflowing their banks. This water is partially stored in numerous small reservoirs, the capacity of which is entirely inadequate to reclaim the available agricultural land.

FORESTS.

The best part of the country near the snow line is covered with a good growth of long-leafed pine, varying from saplings to immense trees 4 to 6 feet in diameter. This timber is protected by the Government and is practically untouched. The timber area is about 600 square miles in extent, and is worth millions of dollars in itself, besides its incalculable influence upon climate and water supply. The foothills of the mountains are covered with a growth of piñon, cedar, and oak, averaging at maturity about 12 inches in diameter. The timber of the foothills is not merchantable except for fuel and fencing, and may be had for the cost of hauling, which is only nominal.

CLIMATE.

The climate is that of most localities in our latitude and elevation. The air is light and dry, and the wind fitful, especially during the spring months, but cyclones and destructive storms are wholly unknown. The summers are mild and pleasant, with cool nights, while the winter season may be compared with the quiet sunny weather of late September in the Middle States. The spring months are dry, but abundant rains set in usually about July 1 and continue well into the fall months. Irrigation is usually employed during the dry season, but is not absolutely necessary for the raising of late crops of corn, wheat, and sorghum.

GRAIN.

Our cool seasons are peculiarly adapted to the raising of small grain. The land under irrigation produces abundant crops. The grain raised in this section is a very large kernel, oats weighing as high as 50 pounds to the bushel. The wheat is of an excellent quality for milling. About 1,250 barrels of flour are turned out annually by our county mills. Springerville is the center of the grain-producing district.

GRASSES.

The only tame grass cultivated is alfalfa or lucerne. This is a most remarkable grass, both in vitality and production. Its roots penetrate the ground to the depth of 8 feet. It does not yield easily to the drought, and in this section produces two or three crops a year. The wild grasses on the mesas consist of white and black grains, Sacaton, and several other varieties, which come up after the first summer rains, and mature and cure before the fall frosts and furnish strong and nutritious feed for all kinds of live stock during the winter. In the spring, after the snow melts in the mountains, a fine growth of bunch and blue grass starts up in the vicinity, and the live stock are driven into the mountains for summer range.

CATTLE.

The cattle industry of Apache County, which formerly was the chief industry of the county, has undergone a very remarkable change, which is attributable to natural causes: First, the liability of the occurrence of droughts in an arid country; and second, the disposition of stockmen to overstock a new country.

In 1888 the territory which now constitutes Apache County had not less than 40,000 head of cattle, while to-day the number of cattle in the county will not exceed 10,000 head, a condition far more favorable to the interests of the cattlemen than when the county was overstocked with cattle.

SHEEP.

The chief rival of the cattle industry is the sheep industry. In the latter less money is required to begin with, and hence more persons are engaged in it. The sheepmen are usually residents and personally superintend their business. The range is naturally adapted to sheep breeding and severe losses are unknown. The mesas are generally well covered with cedars, which furnish protection to the stock during the stormy winter weather, the sagebrush and other undergrowth being sufficient for their subsistence. During the summer months the flocks are all driven into the mountains where they find an abundance of green feed. The annual wool clip reaches about 750,000 pounds, and is one of the county's principal resources.

TOWNS.

St. Johns, the county seat, is located on the Little Colorado River, near the center of the county, 15 miles from the railroad. It has approximately a population of 1,500 inhabitants, 1 Catholic, and 1 Mormon church, 2 public schools, 1 flour mill, 4 large general stores, a substantial court-house and jail, and 1 newspaper, The St. Johns Herald.

Springerville is located in the southern part of the county, with a population of about 800 inhabitants, 1 flour mill, a Catholic church, 3 stores, and 1 substantial school building,

Concho is near the center of the west line of the county, containing a population of about 500 inhabitants, 3 stores, and 2 public schoolhouses. It is the center of the fruit raising and sheep industry.

Other small towns are Nutrioso, Alpine, Eagar, Greer, and Navajo.

SCHOOLS.

There are 12 school districts in the county, which employ 19 teachers for a term of five to six months, at salaries ranging from $40 to $85 per month. Teachers are generally graduates of first-class normal schools, and examinations are under the supervision of the Territory superintendent of public instruction.

IRRIGATION.

There are about 8,000 acres under ditch in the county. This has all been carved out of waste land, practically valueless to the Government. The work of water development and land reclamation has been done by our home people in every instance, without the aid of outside capital. The plan of operation, usually, is to organize a stock company, the stock being paid for by work in the construction operations.

Farming in this county is no experiment. It is an unqualified success, and is limited to a few thousand acres, solely because of a lack of water development. Substantial improvements in that direction are underway, however. The St. Johns Irrigation Company, a cooperative concern which now irrigates some 3,000 acres of bench land, has two reservoirs completed, at a total cost of $15,000, and has another reservoir under construction, which will cost $15,000 more, and which will irrigate between 3,000 and 4,000 acres in the neighborhood of St. Johns. All the water supply is from the Little Colorado River and its tributaries.

Apache County has been known as essentially a stock-raising county, but its agricultural interests are certain to become an important factor in the general prosperity within the near future. Our people are alive to the necessity and importance of water storage, and the undeveloped resources of the county in respect of available reservoirs sites comprise a valuable asset. Nor will the development of the county's agricultural resources conflict with the live-stock interests. The land reclaimed and available for reclamation forms little or no part of the grazing lands. As a matter of fact the stockmen welcome the farmers, from whom they are able to purchase all their supplies, while the extension of the alfalfa fields will mean better opportunities for fattening the range cattle.

Assessed valuation of property in Apache County.

Land (114,790 acres)	$34,437.00
Improvements	69,300.00
Railroad land (769,360 acres)	154,128.89
Town and city lots (487)	16,999.00
Improvements	46,505.50
Horses:	
Range (1,195)	12,485.53
Work (882)	24,443.00
Saddle (761)	14,078.50
Stallions (16)	1,075.00
Mules (53)	1,350.00
Asses (179)	862.00
Cattle, range (7,589)	75,890.00
Milch cows (536)	9,414.00
Sheep (109,104)	218,208.00
Goats (3,001)	6,002.00
Swine (172)	619.00
Railroad standard gauge (54 miles)	136,205.00
Pullman Palace Car Company	2,986.99
All other property	182,435.66
Total	1,007,425.07

GILA COUNTY.

County seat, Globe.

County officers—Supervisors, G. D. Barclay, J. G. Oldfield, J. B. Freeman; treasurer, A. H. Morehead; sheriff, W. T. Armstrong; district attorney, P. W. Fleming; probate judge, T. M. Thurmond; recorder, R. J. Williams; clerk board of supervisors, R. J. Williams.

Gila County occupies a peculiar position, geographically, lying in the eastern central part of the territory, bounded on the north by the rim of the Mogollons,

stretching into the Apache Indian Reservation on the east, defined by the foot of the Four Peaks on the west. One glance at the map of Gila County recalls the expression, "a country of magnificent distances."

CLIMATE AND NATURAL OBJECTS.

The climate of Gila County presents features of the widest diversity. In winter one may drift from the snow-clad forests of Pine and Payson to the rare salubrity of Globe and the Salt River Valley; in summer he may be seen wending his way back to the perfumed groves in the shadow of nature's stupendous wall, "the rim" of the Mogollons. Even from Globe, where in summer the climate is sometimes on the ardent order during the heat of the day, a 10-mile drive to the Pinal Mountains will bring one to a cool and delightful atmosphere.

No other field in the wonderful West holds out greater attractions to the tourist, the health seeker, the man with the gun and rod, the brush and camera. Among other remarkable objects are the Natural Bridge, near Pine, the majestic "Rim," the Salt River Valley canyon, and the caves and labyrinths of the East Verde. The Natural Bridge brings hundreds of sight-seers every year from Globe, a distance of 118 miles, and no one who ever looked upon it ever regretted the four days of dusty travel necessary to reach it. It is a majestic span of nature's masonry, from the edge of which a tiny silver stream can be seen, 200 feet below, the mighty arch being over 300 feet in length and containing sufficient material to build a city. This arch at one point is only 6 feet thick, and a hole about the size of a man's body gives the delighted observer a perfect view of the wonders below him; yet on the top of the great bridge there is a fine farm.

The "Rim" of the Mogollons forms one of the most sublime pictures ever contemplated by man. It extends 150 miles, and simply constitutes an abrupt descent from the great elevated table-land known as the Coconino forest, down to the plains altitude of southern Arizona. For miles, in places, the mighty wall stands 2,000 feet above, as perpendicular as the walls of a house, with cactus, catclaw, and mesquite at the bottom, and the long-leaved pine dangling over the top. Altogether it may properly be considered one of the greatest natural wonders in America.

The valley of the Upper Salt, about 25 miles north of Globe, spreads out for several miles, where enterprising ranchers, aided by abundant water, exhaustless timber from the near-by Sierra Anchas, and every aid which generous nature affords, have made substantial improvements. The valley terminates in a canyon so narrow, deep, and precipitous that it constitutes a natural wonder, and this canyon has been selected by the Hudson Reservoir people as their dam site. A dam 200 feet in height will be constructed, which will store sufficient water to irrigate the whole of the Salt River valley and the adjacent mesas. Other fine attractions are the hot springs, 30 miles north of San Carlos, the cave dwellings, and other prehistoric ruins in the greatest profusion, together with wonderful fossils and almost every natural attraction known.

FRATERNAL SOCIETIES.

Globe is the most enthusiastic secret society city in the Territory. The Odd Fellows have just completed a fine brick hall which would be a credit to any town of 5,000 people. The Masons also control a commodious hall, the Knights of Pythias have a fine lodge, while the Ancient Order of United Workmen, Woodmen of the World, Elks, Foresters, Miner's Union, Good Templars, Red Men, Rebeccas, and Ladies' Auxiliary of the Red Men are in a flourishing condition.

AGRICULTURE AND HORTICULTURE.

During the present year, more than ever before, extensive practical experiments have proved that all standard varieties of fruit reach a degree of perfection in Gila County seldom equaled on the coast, while wheat, corn, barley, and alfalfa are raised in abundance by irrigation in the lower sections, and without it in the higher localities. The little settlement of Pine, which nestles at the foot of the "Rim," has demonstrated very forcibly what the possibilities of the soil are in Gila County.

CATTLE.

The cattle industry, which was somewhat crippled in 1897, has revived wonderfully since the beginning of 1898, and men are greatly cheered by the outlook. The past season was favorable and the range correspondingly good. The completion

of the railroad to Globe enables owners to market cattle which would not otherwise be moved out of the county on account of having to drive over a dry country, and the industry still holds its place, second only to mining.

RAILROADS.

The sad confession, unavoidable in Gila County's last report, that it was the only county in the Territory without a railroad is happily no longer necessary. The Gila Valley, Globe and Northern Railroad is in full operation, connecting with the Southern Pacific at Bowie, and has its terminus at Globe. It operates about 28 miles of road in the county, and will shortly be extended to the Black Warrior, 9 miles northwest of Globe. The road carries spurs to the smelters of the Old Dominion Copper Mining and Smelting Company and the United Globe mines. It is conceded that the road has been prosperous to a degree that astonished its promoters. It has not only been a great success for its investors, but has increased the prosperity of Globe and the whole county inestimably. For twenty long years the pioneers of Gila County have waited and prayed for the happy hour when the neigh of the iron horse should echo against the ribbed walls of Pinal Mountains; hundreds grew feeble with age and sank into the grave as they waited, but the survivors have lived to realize their hopes, and the enhanced value of their property since the advent of the road secures them an independent old age. The construction of the road distinctly marks a new and grander era for Gila County in every department of its industrial affairs.

MINING.

This is, of course, the crowning industry of Gila County. It is one matter in which Gila County ranks with any community in the coast country. Twenty years ago the copper mines of Globe realized handsome dividends, when it was necessary to purchase everything needed at a much higher price than now; when railroad freight rates were nearly double, and everything taken in or out was dragged from Willcox, a distance of 140 miles, through sand and dust, and while copper was 10 cents, instead of 18 cents. Nothing else could speak stronger for the extent and richness of these mines. The Old Dominion and the United Globe are the pioneer properties of the camp, and millions have been produced from the yawning stopes with which the mountain is honeycombed. The advent of the railroad, of course, has stimulated their operation and doubled their capacity to produce. The Old Dominion has, during the last year, put in thousands of dollars' worth of new machinery, one feature in their improvements being the finest hoist in the Territory, and the company employs something near 450 men. The United Globe has made similar strides, and contemplates putting in a leaching plant in the near future. It employs about 500 men.

The Black Warrior Company has two groups of mining claims located 7 miles west of Globe, in Gila County, there being 40 claims in all. The Black Warrior mines have been working continually for the past three years, and have been developed from a promising prospect to producing mines; during which time the company has made large shipments of copper ore, averaging 14 per cent copper, to the local smelters at Globe, and since the completion of the Gila Valley, Globe and Northern Railway the company has been making regular shipments of from two to six carloads per week of its high-grade ore to Silver City reduction works. During these shipments there have been from 50 to 75 men developing the property and blocking out ore, preparing to supply the 150-ton plant which the company has erected for the treatment of its own ore on its own property for the production of copper and bullion. The company has spared no pains in its equipment, and has in connection with the plant a reverbatory furnace and has now commenced the erection of a sulphuric acid plant.

It is claimed that the ore actually blocked out upon the Dadeville and Montgomery claims alone shows 100,000 tons of copper ore, averaging 10 per cent copper, the ore bodies being explored to the depth of 300 feet on the dip of the vein, there being over 3,000 feet of development work upon these two claims alone, in all the workings of which the ore bodies are encountered. The ore is worked by gravity from the mines through an adit tunnel, which taps the workings at the lowest level; the ore then passes by gravity along a tramway 6,000 feet, where it reaches the plant, which is constructed on the gravity plan, below which is the reverbatory furnace, which turns out the bullion in its finished state.

The company has a small town of its own near the works, consisting of a warehouse, office, store building, comfortable dining hall, blacksmith shops, laboratory, bunk houses, and residence of the superintendent, water-pipe lines being laid to

convey water to all the buildings in the camp. The plant has been especially constructed for the treatment of the oxide ores of the Black Warrior at the minimum expense, and nature has favored this property to that end. From the farthest workings of the mine there is a continual slope which does not end until the scales which are to weigh the bullion are reached, a distance of over a mile.

Besides the foregoing leading properties, many others are fast assuming the proportions of standard paying mines, while the hills are full of miners and chloriders who do well, working small properties on a private scale and shipping the ore and selling it to the large smelters.

The Pinto Creek district is coming to the front as a copper and gold camp, several important sales having been made to good companies during the last four months.

Valuable copper properties exist also near Payson, on Tonto Creek, and in the Gun Creek district, and the mining outlook as a whole is vastly better than ever before since the organization of the county. It is principally this industry which makes a demand for all the products of the range, the ranch, the garden, and the orchard, and has built up the wealth of Gila County, and to it the people look for the greatest measure of prosperity ever known to any section of Arizona.

NEWSPAPERS.

The press in Gila County consists of two weekly newspapers, the Arizona Silver Belt, owned and published by the venerable Judge Hackney and Joseph Hamill, and the Globe Times, published and owned by the veteran frontier newspaper man, R. C. Brown. Both papers are ably edited and work with true frontier enthusiasm for the upbuilding of their community.

A general recapitulation of the progress of the county since the last report would reveal astonishing advancement in industrial conditions, and the total value of all property would appear much greater in the report if people could learn that a full-value assessment, along with a light tax rate, advertises a community vastly better than an under assessment along with a heavy tax rate.

Assessed valuation of property in Gila County.

Land (3,002 acres)	$16,574
Improvements	128,470
Patented mines (53)	152,900
City and town lots	66,430
Improvements	136,867
Horses:	
Range (1,226)	12,260
Saddle (1,875)	40,866
Mules (98)	2,450
Asses (357)	1,785
Cattle (40,766)	407,660
Sheep (13)	26
Goats (4,411)	8,822
Swine (377)	1,885
All other property	271,912
Total	1,248,907

MOHAVE COUNTY.

County seat. Kingman.

County officers.—Supervisors, Ed Imus, M. Scanlon, J. S. Kolar; sheriff, Harvey Hubbs; treasurer, A. Cornwall; district attorney, William G. Blakely; recorder, John P. Feeny; probate judge, J. A. Logan; clerk board of supervisors, John P. Feeny.

Prior to 1864 Mohave County composed a portion of Donna Ana County, N. Mex., but after the organization of the Territory of Arizona it was formed into one of the four original political divisions into which the Territory was divided. It embraces 16,000 square miles of the northwestern part of the Territory. It is traversed by high mountain ranges and broad valleys, covered many months in the year by luxuriant vegetation and nutritious grasses. Until 1882 its only means of communication with the outside world was by stage to San Bernardino, or river steamer to the Gulf of California.

LANDS.

The number of acres of land now under cultivation is over 2,500; and on the Colorado River below Fort Mohave several hundred more acres are in process of reclamation.

The irrigation canals of the county are purely of a lateral nature, built to carry water over small sections of land. On the Big Sandy each farmer has taken out a ditch from the creek to irrigate his own tract of land, consisting from 50 to 300 acres. Thirty-five miles of ditch will cover the irrigation district of the Sandy. In the valley of the Colorado River the Government has a pumping plant which supplies water for about 100 acres of land. Several ranchers irrigate small parcels of land from wells, while the Mohave Indians await the overflow of the river to put their land in proper condition for crops.

LAND RECLAMATION.

There are in the county of Mohave, not including the high mesas, over 4,000,000 acres of land that can be readily reclaimed. Lands along the Colorado River, in the Mohave Valley, grow every semitropical fruit. No frost falls in the lowlands. In the mountain ranges are many springs, the waters of which are used to irrigate small patches of land. West of Kingman several of these springs have been converged at Beale Springs and a beautiful fruit orchard propagated. This year the crop has been usually large, and thousands of dollars' worth was shipped to outside points. The peaches raised on this ranch are of the most luscious flavor and are of enormous size. North of this ranch is Oak Creek, the largest orchard in the county. Nectarines, peaches, apricots, figs, apples, pears, plums, pomegranates, almonds, grapes, and many other fruits are here grown in abundance.

LIVE STOCK.

A decrease is shown in the number of range cattle in Mohave County as compared with the number reported by the assessors last year. In 1898 there were 25,705 head, while this year only 22,257 are reported. The drought of the past several years has caused some loss, and at the same time influenced cattle growers to dispose of their herds and get out of the business. Under ordinary conditions this country would be an ideal cattle-breeding country, but the uncertainty of the rainy season keeps men from investing in the industry.

MINING.

The people of Mohave County depend almost entirely on the product of the mines. For years the mines were worked almost exclusively by "chloriders," and the product has been enormously large. Forty million dollars will not cover in value the gold and silver taken from the mines since their first discovery. Since the discovery of the mines of White Hills in 1892 many mining companies have invested in mines and have expended thousands of dollars in development. Notably is this the case at White Hills, where an English company, after paying $1,750,000 for the White Hills group of mines, has expended over $500,000 in developing water and blocking out ore bodies in the mines. This company has built a ten-stamp mill on the G. A. R. mine and a 40-stamp mill on the Occident. Failure to develop a sufficient water supply has been a great drawback to the company's operations, but to date the production of bullion runs up into the millions of dollars. A carload of ore shipped under the former régime from the G. A. R. mine contained 29,000 ounces of silver and over 100 ounces in gold. Chloriders took from the surface of the White Hills veins many tons of this grade of ore. Under the new management a new prospecting shaft 2,000 feet in depth will be sunk, the work to begin as soon as the heavy machinery is put in. At Chloride a Scotch syndicate has in operation a concentrating plant capable of handling 100 tons of ore daily. This plant handles the output of the Elkhart mine. On the same lead the Hualapai Mining Company has 2 hoists in operation, the mine product passing through a process which cleans the metal from all gangue. The main shaft is down 400 feet, and the vein shows 16 feet of well-mineralized filling. The output at present is about 20 tons daily of clean lead. Farther to the south, on the same lode, is the Bullion Beck and Mollie Gibson, with one hoist. The main shaft is down nearly 200 feet and has the richest lead ore in the district in the bottom. The claims are worked by E. J. Carter, of Montana, brother of Senator Carter. About a mile southeast of the Mollie Gibson is the Payroll. A new hoist has just been installed, and 3 shifts are at work in

the shaft. The ore of this vein carries good values in lead, gold, and silver. The vein is 12 feet wide on the surface. John Bany has 16 feet of ore in the Minnesota, and the assorted product runs away up in the hundreds of ounces in silver. Mr. Bany has a hoist on the mine and has exploited it thoroughly above the 200-foot level. He also has a hoist on the Juckahoe, a claim northwest of Chloride and about 2 miles from the post-office. The Merrimac, west of the Chloride, is producing big ore. It has a good hoisting plant and is working a good force of men. The Juno is operating a hoist. Prospectors have flocked into the hills in all directions from Chloride. Good ore is being discovered in all the surrounding hills, and prospectors are feverishly doing their title work. The town of Chloride now has an estimated population of 800, where a year ago there was but little over 100. Across the valley from Chloride new gold discoveries have been made, and a Philadelphia company has put in a 10-stamp mill to work the ores from a claim which they recently purchased. Frank Rockefeller, one of the Standard Oil magnates, has purchased one of the claims in the new camp and is opening up a wonderful body of gold-bearing lime-carbonate ore. The extraction of the gold from its ores in the camp is an easy matter by the cyanide process, the loss of cyanide being 16 cents per ton of ore treated. At the Sheeptrail mines, near Bulls Head Rapids, the Arizona and New England Mining Company has put in a 20-stamp mill and are making a great success. In Mineral Park Basin are many veins carrying gold and silver. A number of the old abandoned claims have been relocated and are producing gold ore. Notably is this the case with the Quick Relief. After doing considerable dead work the former owner abandoned the property, which, relocated by the present owner a few feet in new ground, brought to light 2 feet of very rich silver ore. A drift is now being driven on this ore, and it is holding its width and value. The Keystone and Buckeye are the only mines in the basin having hoists, but there are several mines being worked. The Queen Bee is an ore shipper, as is also the Lady Bug, Lone Star, and Home Pastime. At Layne Springs the Nighthawk mine continues to be a big producer. The Mint, one of the old abandoned claims, has developed into a phenomenal ore producer. Ore as it comes from the mine is valued at 1,300 ounces silver and 12 ounces gold. The Blackfoot and Oro Plata mines, in Todd Basin, are big producers. The Oro Plata produced nearly $200,000 last year under leasehold workings. In Union Basin are many good veins of mineral. At Cubat the Golden Gem mine has been opened up at a depth of 330 feet and has produced $150,000. It has a good hoist. The Flores, on the west of the Golden Gem, has a 5-stamp mill and hoisting plant. The Cubat mine has been exploited to a depth of 200 feet. All these claims are gold-bearing, and the latter claim is also copper-bearing. In and around this camp are many veins carrying lead in paying quantities. To the east of Cubat is the famous Stockton Hill Camp. Here are located many rich veins of silver ores, and the united product of the mines will reach into the millions. The deepest mine is only 40 feet, and above this depth $500,000 has been produced. The vein in places has a width of 20 feet. The Infallible, Tigress, Little Chief, Bluebell, Pine, Metal, Fountain Head, Miner's Hope, Prince George, Dictionary, and many others have been wonderful producers. The C. O. D. mine has produced 1,000,000 ounces of silver, besides gold and lead, above the 400-foot level. Ore left in the old drifts and stopes, and which was considered worthless, is now found to contain 4½ ounces gold to the ton, and preparation is being made to unwater the mine and give the property a new lease of life. At Gold and Lost Basins are many big veins of low-grade gold ore and smaller veins of shipping values. Lack of water is the drawback to successful operations in these districts, but conditions are constantly changing, and the future may have good things in store for the mine owners who have held on to their properties for years. Peacock district has a few good mines, but at present little work is being done on them. In the Hualapai Mountain, the Old American Flag Mine, is being reopened by a small force of men. In early days its ores were rich enough to ship to Swansea, England, for treatment. Cedar, Ruby, and Owen districts are producing shipping ores in a small way, although they merit a better fate.

The old McCrackin mine, in Owen district, produced nearly $4,000,000 in silver, all ores being mined through tunnels. The deepest working is only 80 feet below the lower tunnel level. Along the Colorado River, from the mouth of the Grand Canyon to Bill Williams Fork, are immense gravel beds, carrying from a few cents to $2 to the cubic yard of placer gold. Thousands of locations have been made along the river and considerable gold extracted. At Temple Bar a French company has put in a hydraulic plant to work the rich bench diggings, but were depending upon catching driftwood sufficient for fuel. A glance boom has been put in the river, but no drift has come down since its completion, and outside of

a trial run to test the machinery no sluicing has been done. The gold is mainly very fine, but nuggets weighing four ounces have been taken out. In the Chemehuevis Mountain occurs a sedimentary deposit carrying gold. Detritus from this deposit has furnished ground for the operation of panners and dry washers for twenty years, and fully $1,000,000 has been taken out.

Three mountain ranges traverse the county from north to south, and their rocky ribs are seamed with ledges of gold, silver, copper, and lead. Near Mineral Park are many ledges of turquoise, which show evidence of having been systematically worked by a prehistoric race. Stone hammers and rude tools have been found in all the openings in the mines. For the year ending June 30, 1899, the ore shipment through the Kingman Sampling Works and to the smelters and bullion by express is valued at $1,500,000. Shipments of lead aggregate over 600 tons.

CLIMATE.

The climate of Mohave County is indeed delightful. In the mountains it is cool and exhilarating during the summer months, while in the valleys it never becomes oppressively hot. For an all-the-year-round climate it surpasses anything in the world, and some day in the not distant future it will be the resort of invalids from all parts of the country.

AGRICULTURE.

The amount of barley produced for the year ended June 30, 1899, was 200 tons; wheat, 100 tons; corn, 10 tons. On the Big Sandy and in many parts of the county a good business in the culture of bees has sprung up in recent years, and now there are over 800 stands.

HORTICULTURE.

In bearing orchards there are 40 acres in the county. The fruit is so well known that it readily sells in the outside markets at figures far in advance of the California products. Seven cents per pound is realized from the fruit delivered at Kingman. Peaches, figs, apricots, apples, nectarines, and grapes bring the same price. Little patches of land in the vicinity net the owners enormous profits.

SCHOOLS.

Mohave County boasts of more schools to the population than any county in the United States. Wherever the necessary number of children can be found there will also be found a school. There are 14 school districts, with 15 teachers. Kingman has a handsome brick schoolhouse capable of accommodating 200 children. Hackberry, White Hills, and Sandy have also good school buildings.

CHURCHES.

There are 2 churches in the county, and Kingman and White Hills are the proud possessors.

NEWSPAPERS.

There are 2 newspapers published in the county—the Mohave Miner (Independent) and Our Mineral Wealth (Populist).

HOTELS.

There are 14 hotels in the county.

UNDEVELOPED RESOURCES.

We would call the attention of our Chief Executive, and through him the Interior Department, to the great undeveloped wealth of our valleys, rich in nature's fertile soil, only awaiting the moisture of our mountain streams to make them yield a golden harvest. Mountain gorges there are in which to impound the flood waters sufficient to irrigate thousands of acres, and, were this not feasible, there runs through our northern border one of the mightiest streams on the continent—the great Colorado of the West. The water runs through the canyon like a tailrace and will generate millions of horsepower, and this power can be used in pumping water onto the uplands. Capital to carry out this immense project is all that is necessary to develop these millions of acres.

Hualapai Valley is overrun with the canaigre plant, and a factory to extract the tannic acid could be carried on successfully. Another industry that could be carried on here successfully is the production of cement from the immense gypsum beds along the Colorado River northwest of Kingman. Tanneries could be run successfully at any of the towns along the line of railroad.

STATEHOOD.

Our people are a unit in favor of statehood.

In conclusion, I would say to the worker that Mohave County offers an unexcelled field. In no place is the labor of the farmer, mechanic, or miner better repaid than here. There are thousands of mines open to location in our mountains, while our valleys are rich and unsettled.

Assessed valuation of property in Mohave County.

Cultivated land	$28,335.00
Uncultivated land (112,000 acres)	22,400.00
Railroad land (535,396 acres)	112,555.83
Patented mines (99)	38,674.56
Improvements on patented mines	87,205.00
Improvements on unpatented mines	27,715.00
Town and city lots	46,037.00
Horses:	
Range (1,181)	23,620.00
Work (330)	16,500.00
Saddle (1,001)	35,035.00
Stallions (2)	100.00
Mules (14)	490.00
Asses (85)	425.00
Cattle, range (22,257)	222,570.00
Milch cows (87)	1,740.00
Bulls (3)	75.00
Sheep (14,573)	29,146.00
Goats (800)	1,600.00
Swine (105)	368.00
Railroad, standard gauge (108,076 miles)	270,190.00
All other property	263,252.55
Total	1,228,033.94

COCHISE COUNTY.

County seat, Tombstone.

County officers.—Supervisors: R. W. Barr, M. C. Benton, John Montgomery; sheriff, Scott White; treasurer, A. Wentworth; recorder, Frank Hare; district attorney, Edward W. Land; probate judge, W. F. Bradley; clerk board of supervisors, A. H. Emanuel.

Cochise County is in the southeast corner of the Territory. It was named for one of the Indian chiefs who formerly ruled the Territory within its boundaries. It contains many historic spots connected with the early settlement of Arizona and the Indian wars connected with that period. One notable trace of pioneer methods is the old Butterfield Trail, over which mail, express, and passengers were carried in the ante-railroad days by the "pony express." Mail and express was carried over this route between St. Joseph, Mo., and San Diego, Cal.; 20,000 horses are said to have been employed on the line. The climate is equable. Most of the surface of the county is sufficiently elevated to make the climate cool in summer and not severe in winter. Like nearly all portions of Arizona, Cochise County is mountainous.

The Chiricahua Mountain district is one of the wildest sections in the United States. Bear, deer, lions, and other varieties of wild annimals roam here and multiply almost undisturbed. The mountain slopes are covered with a good growth of timber, which furnishes lumber to the mill man, stulls and lagging to the miner, and fuel to all classes, thus greatly assisting all industries. The rugged folds of their great ridges store water, which finds its way to the surface in springs, or flows underground at a small depth, which enables stockmen to raise it easily to water their herds. Many pleasant retreats are found beneath their sheltering cliffs and groves for persons seeking refuge from summer's heat. The different

ranges serve as condensers, thus causing throughout the county a fair rainfall. During the year 1899 most parts of the county have been well favored with rains, and good feed, fat stock, and a fair crop of hay is the result.

While the soil of Cochise County is fertile, still, for lack of water sufficient for irrigation, the great need of the entire Southwest, the county can not make large claims as a farming county. However, along the streams and in many canyons hardy husbandmen have taken advantage of the natural facilities and are raising excellent crops of hay, fruit, melons, vegetables, and grain, all of which crops thrive wonderfully where enough water can be had to irrigate them sufficiently. It is, however, as a mining and stock-raising county that Cochise can boast. A great variety of ores are mined, including gold, silver, copper, lead, and wolframite. Roofing slate and some valuable building stones are also a part of her wealth. The Copper Queen Mining Company at Bisbee is one the leading concerns of the world for the mining of copper. Its works are located at Bisbee, and a railroad reaches them, which forms a junction with the Southern Pacific at Benson. The Copper Queen Company employs a veritable army of men, and the trade resulting from its employment furnishes business to a great number of other people and industries. Bisbee is the largest city in the county, having a population of about 5,000.

The Commonwealth and other mines owned by the Commonwealth Mining and Milling Company at Pearce are bonanzas. The revenue to the owners, from a conservative estimate, is $500,000 a year, although the company does not need to employ more than 100 men. The capacity of the mill on the company's property has been increased from 20 to 50 stamps during the year.

The wolframite mines, as well as mines of other metals near Dragoon, have attracted a great deal of attention, and some important deals affecting them have been accomplished. There are a number of companies operating in that district, besides several individuals.

A stamp mill for treating ores has been reconstructed during the year at Dos Cabezas. Some placers in that district are also exciting interest, and some work is being done on them. Dos Cabezas, located 15 miles from Willcox, is one of the oldest mining camps in the Territory. Gold is the principal ore mined there, although others are found in paying quantities. Some important deals in mining property have been made there during the year.

Tombstone mines, after many years of almost total inactivity, are lately taking another start under the operations of lessees, some of whom are said to be doing extra well, while all are doing well. The people there are hopeful that the plan above mentioned may prove a complete success, and that those fabulously productive mines may again be turning out their mints of the white metal.

Everywhere throughout the county there is great activity in mining. At Turquoise, Barrett Camp, Middlemarch, Golden Rule, and other properties in the Dragoon district, extensive work in the way of extracting ores and developing properties is being done. A smelter at Barrett Camp will soon be operating upon copper ores. A stamp mill to work the ores of the Golden Rule, and to do custom milling also, has been erected at Cochise, a small station on the Southern Pacific, during 1899.

That men have confidence in the ore supplies of the county throughout is evidenced by the amount of work and money that is at present being expended in developing property, and sinking to discover ore bodies. Greater activity than usual has been shown in this direction during the past year, and the inquiries have been more numerous for mining property than for some time.

The cattle business has also been unusually and gratifyingly profitable. Good rains have fallen and prices have been excellent, and as a consequence stockmen feel like princes. Willcox still holds its place at the head of the list of cattle-shipping towns, having shipped 31,794 head to September 1; and still stockmen aver the number shipped can scarcely be missed off the ranges, so abundant are the stocks in Sulphur Spring Valley and on adjacent ranges. A great impetus has been given to the stock business by the excellent prices which have prevailed during the year. Extensive and valuable improvements in the way of increasing water supplies and improving ranch property have been made.

Although cattle raising takes the lead, still the raising of sheep, horses, and mules ought not to pass without mention in an article treating of the resources of the county. Valuable herds of sheep are grazed here, and the excellent prices obtained for wool and mutton swell the accounts of their owners.

A great many horses roam on the ranges as free as nature itself. Their chief use has been as saddle horses in handling all kinds of stock. However, horse owners are hopeful that the causes now influencing prices may make the breeding and raising of good, clean-limbed, hardy horses a paying business.

Cochise can claim first rank in stock raising. Her broad plains and great mountain areas, her wells and springs, creeks and rivers, her free grass and semi-tropical climate, all combine to make Cochise an ideal place for breeding and raising stock. Many of her best citizens are engaged in this industry and vast amounts of capital are invested in it. Many ranches and ranges, comparatively deserted for years, have been reclaimed during this year.

The county is as well governed as any other. As much vigilance is shown by officials in the pursuit of criminals as in any of the other counties, and as much moral reprehension is measured out to crime and immorality as anywhere else within Arizona. The county supports its public schools well, the expense of their maintenance for the coming year being estimated at over $20,000. Churches are also recognized as a necessity to civic as well as religious life, and several different denominations receive the support of the people. It was thought that Cochise would be able this year to take rank again as a first-class county, but her hopes were disappointed, as the assessment fell a few thousand dollars short of the amount required to give her that rank. However, there has never been a year in the history of the county when there has been such an even and general advance in all substantial respects in the industries of the county.

Property has enhanced in value. The merchandise business has been profitable and enlarged in almost every case. Willcox has added electric lights and an ice and cold-storage plant. Benson has acquired a newspaper, the Benson Breeze by name.

Men who want employment are seldom turned away. A large hay crop will be harvested this year. The calf crop is large.

There are few, if any, counties in Arizona which present any greater variety of enterprises, a better opportunity for employment, or more flattering inducements to that class of home seekers who are willing to work for what they get and wait a reasonable time for results.

Assessed valuation of property in Cochise County.

Land (23,977 acres)	$54,657.00
Improvements	79,020.00
Land grants (72,918 acres)	76,417.00
Improvements	310.00
Patented mines (236)	17,050.00
Improvements	72,874.00
City and town lots (1,407)	27,727.00
Improvements	344,369.00
Horses:	
Range (1,858)	18,620.00
Work (956)	24,856.00
Saddle (1,096)	20,091.00
Stallions (19)	990.00
Mules (119)	2,975.00
Asses (191)	1,018.00
Cattle:	
Range (66,477)	665,620.00
Graded (125)	3,750.00
Milch cows (123)	1,935.00
Bulls (55)	1,039.00
Sheep (6,710)	13,420.00
Goats (427)	854.00
Swine (90)	325.00
Railroad, standard gauge (177.85 miles)	991,948.50
Pullman Palace Car Company	881.20
All other property	555,251.00
Total	2,974,897.70

SANTA CRUZ COUNTY.

County seat, Nogales.

County officers.—Supervisors, A. H. Noon, A. L. Peck, R. E. Rey; probate judge, Eb. Williams; sheriff, T. F. Broderick; treasurer, Fred Herrera; recorder, W. N. Cummings; assessor, Frank J. Duffy; surveyor, Charles E. Perkins; clerk board of supervisors, W. N. Cummings; district attorney, W. P. Harlow.

NOGALES, SANTA CRUZ COUNTY. SHOWING BOUNDARY LINE BETWEEN ARIZONA AND MEXICO.

Santa Cruz, the thirteenth and last county organized in the Territory, was created by act of the twentieth legislative assembly, approved March 15, last. It is also the smallest county, the area being approximately 1,200 square miles, and was formed by detaching the southern portion of Pima County, lying along the Mexican border.

The chief industries of the new county are mining and stock raising, the moderate amount of farming conducted being mostly confined to the lands immediately adjacent to the Santa Cruz River, which traverses the county from north to south. It is possible, however, to develop water so as to make a substantial increase in the agricultural area.

The county starts off under favorable auspices. The people are generally prosperous. As in all other portions of the Territory, the live-stock industry is in a splendid condition. In mining, the revival of interest is pronounced in all the districts. Nogales, the county seat, is growing steadily, and all the leading branches of business are prosperous.

The county is rich in mineral resources, and offers a tempting field for the prospector. There are many districts in which practically no development has been done, while indications are very promising. The districts in which the most development has been done are the Harshaw, Washington Camp, Lochiel, and Oro Blanco.

THE CITY OF NOGALES.

The modern history of Nogales dates from the construction of the New Mexico and Arizona Railroad from Benson to Nogales, in 1892. After that line was extended to Guaymas, on the Gulf of California, Nogales became an important port of entry and has steadily grown in importance.

Nogales—of which there are two, one in the United States, the other in Mexico, the dividing line passing along the center of a broad street—is unique and interesting in more ways than one. As a point of contact between two great nations, the "line city," as it (or they) is familiarly termed, presents salient features and all the habits and customs of both nationalities. Citizens of both republics dwell there together in the closest accord and amity, and engage in social and business connection with an ease and facility which are pleasing to note and gratifying to the patriotic citizens of both countries.

Both governments have there the headquarters of districts in the collection of customs and important consulates. It is a division station upon the through line of railway from the Southern Pacific at Benson and the Gulf of California at Guaymas. The Arizona city is the seat of government of the newly created county of Santa Cruz, and there is a movement on the Sonora side of the line to remove from Magdalena to Nogales the government of the district of the same name. Besides the business naturally caused by being the gateway for an international and transcontinental traffic, Nogales is a very important and flourishing commercial point, the merchants of the place drawing trade from the rich and rapidly developing districts of Altar, Magdalena, and Arizpe, in the State of Sonora, Mexico, and from the equally rich and important regions of Oro Blanco, Duquesne, Harshaw, and Washington Camp, in Arizona. Many of the stores carry extensive stocks of goods, and the enterprise and push of the merchants are known and appreciated all over southern Arizona and northern Sonora. The country tributary is not only very rich in natural mineral resources, but the cattle ranges are among the best and most valuable in the Southwest, and Nogales is the seat of a large import trade in stock from the interior of the State of Sonora. The joint population of the two municipalities is nearly 5,000 souls, and in each there are fine graded schools with large attendance and thoroughly competent teachers, under whose tuition pupils make very rapid progress.

Situated at an altitude of about 4,000 feet, the climate is mild and equable, avoiding the excessive heat of summer in lower altitudes and experiencing but little really cold weather in winter. Bright and pleasant days follow each other in an almost endless succession, and the invalid and health seeker finds the climate unparalleled. Many of the leading citizens and officials in the State of Sonora and their families reside there several months in the year through the heated term. Many Americans operating or employed in mines and business in Sonora have their homes in Nogales, residing there for the educational and climatic advantages presented. Roads ramify in various directions, drawing a heavy trade, and the enterprising business men of the two cities are doing everything possible to improve, extend, and shorten the highways they now have and to construct new ones.

Some years ago the rich and productive Oro Blanco mining region was brought into close relation with the city by the construction of a wagon road, and now

money is being liberally subscribed to construct a good highway to the Cananea Mountains, about 50 miles to the southeast, where very rich copper and silver mines are producing abundantly. A survey for a railway is being made to connect Washington Camp and Duquesne with Nogales. Should the development of coal, now assured in Sonora, prove all that is anticipated, the rich copper mines in those two camps will consume great quantities of the fuel. Nogales will be the best place to transfer it from the line of the Sonora railway to the new line, and in that event the line city will be the junction point of the two roads.

Besides excellent schools, the line cities have 4 churches—2 Catholic, 1 Methodist, 1 Congregational—and the various fraternal societies have strong and flourishing organizations. The Masonic order has a handsome temple, the first erected in Arizona, and the Odd Fellows now have one in course of erection. The Masonic building is a two-story stone structure, and that of the Odd Fellows is likewise two stories, of brick. The Montezuma Hotel and several of the business blocks are imposing structures of brick and stone, and many private residences are very elegant in appearance and finish.

Like Phœnix, Tucson, and many more towns in Arizona, Nogales began as an "adobe town," afterwards changing to a brick and stone. It is now in the transitory stage, as was Phœnix a dozen years ago, and ere many years "adobes" will go out of use as building material. On the Sonora side of the line the Mexican custom-house and municipal palace are imposing structures. The Mexican municipa authorities have recently walled the arroyo running through the town and thrown across it two very fine iron bridges.

Recently the United States issued a patent for the town site on the Arizona side of the line, which has settled finally and completely all questions of title to property. This, in connection with the creation of the new county and location of the county seat, has given the town an impetus which is speedily bringing it to the front rank among Arizona cities.

Crittenden, Harshaw, and Washington Camp are small but prosperous communities.

Assessed valuation of property in Santa Cruz County.

Land (16,909 acres)	$31,619
Improvements	15,580
Land grants (42,318 acres)	10,580
Patented mines (40)	35,000
Improvements	1,935
City and town lots	63,317
Improvements	170,130
Horses (1,933)	26,780
Mules (139)	5,060
Asses (39)	274
Cattle (14,394)	143,727
Sheep (20)	40
Goats (10)	20
Swine (81)	293
Railroad, standard gauge (52.04 miles)	195,976
All other property	237,655
Total	937,986

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[Arranged chronologically from the catalogue and index by N. H. Darton, in Bulletin No. 127 of the United States Geological Survey.]

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1854. Preliminary Report of Survey in California, Blake.
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1856. Reconnaissance from the Mississippi to Los Angeles, Cal., Marcou, J.
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1858. Geology of North America, Marcou, J.
1861. Report on Colorado River, Newberry.
1863. Silver Mines of Arizona, Pumpelly.
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1868. Iron Ore in Northern Arizona, Blake, W. P.
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1869. Chasms of the Colorado, Hyatt.
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1872. Notes on Mining Districts, Lyle.
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1873. Structure of Country North of Colorado Canyon, Powell, J. W.
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1874. Geology of the Valley of the Colorado, Powell, J. W.
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1877. Fossils from Nevada, Utah, etc., White, C. A.
Map of parts of Arizona, Marcou, J.; Gilbert and Marvine.
Map of Parts of Arizona and New Mexico, Gilbert, Howell and Loew.
1879. North American Mesozoic and Cenozoic, Miller, S. A.
Carboniferous Fossils from Colorado, etc., White, C. A.
1880. Permian and Paleozoic of Kanab Valley, Walcott.
Permian of North America, Dutton.
Southern Arizona, Cox, E. T.
Map of the United States, McGee.
Report on Colorado River District, Dutton.
1881. Deer Creek Coal Fields, Devereux, Walcott.
Atlas of Colorado, Hayden.
1882. Porphyry Dike, Tombstone, Blake, W. P.
Volcanic drift of Chalus, Idaho, Julien.
Physical Geology of Grand Canyon District, Dutton.
Excavation of the Grand Canyon, Dutton.
Report of Work in High Plateau Region, Dutton.
Geology and Veins of Tombstone, Blake, W. P., Church.
Tertiary History of Grand Canyon District, Dutton.
1883. Progress of Geology, 1882, Hunt, T. S.
Mining Region, Prescott, Blandy.
Grand Canyon Group, Science.
Geology of Silver King Mine, Blake, W. P.
Pre-Carboniferous in Grand Canyon, Walcott.
1884. Lower Burlington Limestone in New Mexico, Springer.
Relations of Mineral Belts of Pacific Slope to the Upheavals, Becker.
1885. Geologic Sketch of Pacific Division, Becker.
Progress of Geology, 1883, Hunt, T. S.
A Natural Bridge, Gardiner.
Enlargements of Fragments of Certain Rocks, Irving and Van Hise.
1886. Agatized Wood, King.
Cambrian System of North America, Walcott.
Cambrian Faunas of North America, Walcott.
Petrified Forest, Dickinson.
1887. Copper Ores of the Southwest, Wendt.
Map of United States, Hitchcock, C. H.
Phœnix Mine, Ricketts.
Andesite from San Francisco Mountain, analysis, Chatard.
Copper Ores near Morenci, Henrich.
1888. Primary Quartz in Basalts, Iddings.
1889. Copper Deposits of the Copper Basin Blake.
Ores of Tombstone, Goodale.
Reymert Lode, Blauvelt.

1889. Certain Magnetic Rocks, Hanks.
Building Stones, Merrill, G. P.
1890. Analyses of Recent Lavas, Eakins.
Arizona's New Bonanza, Storms.
Displacement in Grand Canyon, Walcott.
Macfarlane's Railway Guide, Dutton.
Primary Quartz in Basalts, Iddings.
Warren's Geography, Brewer.
1891. Analysis of Sandstone, Chatard.
Cambrian of North America, Walcott.
Devonian and Carboniferous, correlation, Williams, H. S.
Fauna of Lower Cambrian, Walcott.
Manganese Deposits, Penrose.
Meteoric Iron Locality, Foote.
Stones for Building, Merrill, G. P.

UNI OF MICH

CAPITOL BUILDING AT SANTA FE.

REPORT

OF THE

GOVERNOR OF NEW MEXICO FOR THE YEAR ENDING JUNE 30, 1899.

SANTA FE, N. MEX., *September 20, 1899.*

SIR: In obedience to your request, I have the honor to herewith transmit to you my report of the Territory of New Mexico for the year ending June 30, 1899, showing the progress and development of our Territory during that period.

I desire to call special attention to the following subjects contained in my report: Education, statehood, report of land commissioner, railroads, irrigation, population, financial condition and taxable property of the Territory and each county, remarks concerning the Old Adobe Palace at Santa Fe, New Mexico war record, agricultural and horticultural development, mining, cattle, sheep and wool, and appropriations.

I have the honor to be, sir, your most obedient servant,

MIGUEL A. OTERO,
Governor of Territory of New Mexico.

The SECRETARY OF THE INTERIOR,
Washington, D. C.

NEW MEXICO.

GEOGRAPHICAL LOCATION AND GENERAL RESOURCES.

New Mexico covers five degrees of the north temperate zone, extending from the thirty-second to the thirty-seventh parallel. Thus it corresponds in length and latitude with the two Carolinas and the major part of Georgia on the Atlantic coast, or with Tennessee and the upper two-thirds of Alabama and Mississippi coming inland. Only Florida among the American States lies wholly south of New Mexico's lower boundary, while but seven and one-half degrees, or one and a half times the Territory's own length, would extend that boundary to the northern limit of the torrid zone. In Europe but the extreme southern parts of Spain and Greece lie within New Mexico's latitudes. All the great resorts of France and Italy, Spain and Greece, with their celebrated skies and boasted climates, lie decidedly farther north. By location New Mexico is distinctly and emphatically a southern country.

PHYSICAL CONFORMATION OF NEW MEXICO.

The topography of New Mexico is interesting, but complex. In shape a parallelogram, with an average breadth of 335 miles and length of 367, it lies, so to speak, broadside to the sun, sloping from north to south, with an elevation of 7,000 feet in the former, sinking down to 3,500 feet in the latter, while many mountain peaks reach a height varying from 8,000 to 13,000 feet. These peaks and their connecting ranges are so scattered as to form the Territory into five distinct watersheds with their respective valleys. The Rio Grande divides New Mexico from north to south into very nearly equal portions and is to this country what the Nile is to Egypt. On the northeast the Canadian outlets the waters of that section into a tributary of the Mississippi, while on the southeast the Pecos has eroded a valley second only in extent to that of the Rio Grande, of which it is the chief tributary. In the northwest the San Juan and in the southwest the Gila collect the waters ultimately reaching the Pacific Ocean.

Each of these main rivers has a vast number of affluent streams, so great in fact that New Mexico is more largely supplied with water courses than is any other mining State or Territory. Along each stream are valleys, beyond the valleys high table lands called mesas, and beyond these the mountain ranges proper. In the mountains and in many of these mesas are deep gorges or canyons with almost perpendicular walls. These collect the water from the melting snows and convey it to the streams ramifying it in all directions. Such, then, is the topography of the Territory. Mountain peaks and chains, high table lands, and lower lying valleys, falling away to the south, thus securing a southern exposure throughout its vast extent of 122,580 square miles, or an area of 100 square miles larger than the land surfaces of New England, New York, and Maryland combined or 1,241 square miles larger than all England, Scotland, Ireland, and Wales.

ABSENCE OF MOISTURE.

The aridity of New Mexico arises partly from her location, partly from her altitude, and partly from her topography. Her location is in the midst of the formerly so-called "Great American Desert," her borders about equidistant, or 500 miles each from the Gulf of Mexico and the Pacific Ocean at their nearest approach. The Gulf of California, at its northern extremity, lies some 150 miles closer, but its water surface is inconsiderable.

The low-lying plains east of the Rocky Mountains draw the moisture-laden winds from the Gulf of Mexico, causing them to pass eastward of this section, but at the same time drawing over the Territory the winds from the Pacific and from the Gulf of California. Before these can reach New Mexico, however, they must climb, height by height, the ascending plateaus of Arizona, culminating in the bald-faced peaks of the Continental Divide. All know that the warmer the air the more water it will hold; and, on the other hand, the more the air is chilled the more it parts with its moisture. Every succeeding altitude but wrings more water from the air, just as each stronger grip of the hand squeezes more water from the sponge. When these almost desiccated winds reach New Mexico only the mountain chains and peaks can draw further moisture from them, leaving the valleys and table-lands with but the scantiest of scant supplies. This is why the average rainfall in the valleys of this Territory will not exceed an

inch per month, two-thirds of the entire supply falling during the summer. Compare this with an average yearly precipitation at New York of 43 inches, Boston 45, Savannah 48, and the smallness of the rain supply will begin to be appreciated.

But altitude increases aridity by decreasing atmospheric pressure, and thus accelerating evaporation. The elevation of New Mexico averaging about 1 mile above sea level and reaching in the higher valleys to nearly 2 miles, it can be seen at once that water here most readily gives off its vapor. Especially is this true when taken in connection with the dry condition of the air and the almost ceaseless movements of the winds. The moisture that falls is immediately taken up into the air again. A snow of 2 or 3 inches in depth will pass away in a few hours, leaving the ground dry, having apparently returned into the air instead of melting. A refreshing shower in a day or two will have disappeared, leaving no mud behind. This is why any kind of a cloud is rare, and a day during some part of which the sun does not shine is almost unknown. Then, too, it must be remembered that the general slope of the country is on an average of about 10 feet to the mile, causing water, even in the streams (unless impounded), to run quickly away. For these reasons the humidity of the air in New Mexico averages about 36 per cent, while in New England it is 73 per cent, Florida 75 per cent, San Francisco 76 per cent, and the Gulf States 79 per cent.

RESOURCES OF NEW MEXICO.

FRUIT.

In the metropolitan markets of the Western States New Mexico's horticultural products command from 5 to 15 per cent greater price than the California products, owing to their size, richness in color, and peculiarly delicate flavor. In grapes, for which the Rio Grande Valley is famous, the Flame Tokay, the Muscats, the Black Hamburgs, and similar choice varieties are grown to perfection. In every quarter of the Territory are profitable orchards of apples, pears, peaches, cherries, plums, nectarines, and all the small fruits indigenous to the temperate and semitropic zones.

SUGAR BEETS.

Experiments covering a period of three years demonstrate that New Mexico excels any other country or section in the world in the quantity and quality of sugar beets. In 1896 in the Pecos Valley some 1,400 acres of beets were harvested. The average yield per acre was a little over 16 tons, and the average percentage of saccharine matter was over 16, the highest record ever made. The gross returns to the farmer averaged $67 per acre, and the cost of raising the crop was a little less than $22 per acre. The almost perpetual sunshine during the growing season is the cause of the extra percentage of sugar in the beets, and the richness and adaptability of the soil accounts for the heavy yield.

CEREALS AND VEGETABLES

Of innumerable variety are profitably produced in New Mexico. The latter are notable for size and flavor, as well as their keeping qualities. Rio Grande Valley oats took the second prize at the World's Fair. Every field crop and all classes of vegetables can be and are grown with success and profit.

MINERALS.

It is no exaggeration to affirm that, in point of natural resources, none of the peerless Rocky Mountain States exceed New Mexico. Gold, silver, copper, iron, zinc, lead, mica, coal (anthracite and bituminous), marble, fire clay, alum, sulphur, soda, salt, asphalt, gypsum, etc., are found in paying quantities in almost every county in the Territory. In many localities are valuable deposits of onyx, while the turquois supply of the world is largely furnished by the New Mexico mines.

TIMBER AND COAL.

These essentials to the home seeker are plentiful and cheap in New Mexico. Tracts of virgin forest, large or small, may be purchased now at astonishingly low figures, since the United States court has rendered such timely service in settling titles to the land grants.

MINERAL SPRINGS.

The attention of the tourist and health seeker is especially invited to the number and varied character of the mineral waters in New Mexico. These are easily accessible by rail, and offer every reasonable accommodation to the visitor. Among such resorts are the Las Vegas Hot Springs, the Jemez Hot Springs, the Ojo Caliente Hot Springs, Hudson Hot Springs, the Sulphur Hot Springs, the Macbeth, Taylor, and Coyote mineral waters.

DESIRABLE LANDS.

New Mexico contains nearly 79,000,000 acres. Of these there are about 24,000,000 acres contained in land grants, Indian and military reservations, railroad grants, and Government entries, which leaves available an area of about 55,000,000 acres of land, capable of supporting an immense population running up into the millions.

Thousands of acres of wild lands are to be had by complying with the United States land laws, much of which is contiguous to water and is desirable for colonization purposes when ditches and water-storage reservoirs are provided. The land-grant question is no longer a bugaboo in New Mexico, and through the action of the land court titles to vast tracts have been cleared up and settled. Some millions of acres have been confirmed by the courts to private ownership, while, on the other hand, an equal acreage has been rejected, so far as the grant claimants are concerned, and the land added to the public domain, subject to entry.

OFFICIAL REGISTER.

Territorial officers.—Governor of the Territory of New Mexico, Miguel A. Otero, Las Vegas, N. Mex.; private secretary to governor, Miss N. P. Crane, Santa Fe, N, Mex.; secretary of the Territory, George H. Wallace; clerk in secretary's office, C. P. Wallace; solicitor-general, Edward L. Bartlett; auditor, Luis M. Ortiz; treasurer, J. H. Vaughn; superintendent of Territorial penitentiary, H. O. Bursum; superintendent of public instruction, Manuel C. de Baca; librarian, Judge Lafayette Emmett; adjutant-general, William H, Whiteman; mine inspector, J. W. Fleming; coal-oil inspector, John S. Clark.

Judiciary.—Chief justice of the supreme court and judge of the fourth judicial district, William J. Mills; clerk, Secundino Romero; clerk of the supreme court, José D. Sena. Associate justices of the supreme court—first judicial district, John R. McFie; clerk, A. M. Bergere; judge second judicial district, J. W. Crumpacker;

clerk, H. P. Owen; judge third judicial district, Frank W. Parker; clerk, J. P. Mitchell; judge of the fifth judicial district, Charles Leland; clerk, John E. Griffith.

Delegate in Congress.—Pedro Perea.

Surveyor-general.—Quinby Vance.

United States revenue collector.—A. L. Morrison.

United States district attorney.—W. B. Childers.

United States marshal.—C. M. Foraker.

Deputy United States marshal.—C. A. Coddington.

Registers and receivers land offices.—M. R. Otero, register, and Edward F. Hobart, receiver, Santa Fe; Emile Solignac, register, and H. D. Bowman, receiver, Lascruces; Howard Leland, register, and George R. Guyer, receiver, Roswell; Edward Fox, register, and A. W. Thompson, receiver, Folsom, N. Mex.

District attorneys.—R. C. Gortner, Santa Fe; W. H. H. Llewellyn, Dona Ana and Otero counties; T. A. Finical, Albuquerque; R. D. Barnes, Silver City; Charles A. Spiess, Las Vegas; A. J. Nesbit, Roswell; S. Alexander, Socorro; J. Leah, Raton, N. Mex.

Public printer.—J. D. Hughes.

Indian agent.—N. S. Walpole.

Court of private land claims.—Chief justice, Joseph R. Reed; justices, W. W. Murray, Henry S. Sluss, Thomas C. Fuller, and Wilber Stone; attorney, Matthew C. Reynolds; clerk, J. H. Reeder.

Officers of Territorial institutions.—The governor and superintendent of public instruction are the ex officio members of the board of regents of the following institutions: The University of New Mexico, the New Mexico College of Agriculture and Mechanic Arts, the New Mexico School of Mines, the New Mexico Insane Asylum, and the New Mexico Military Institute.

The University of New Mexico.—Regents: J. H. Wroth, Albuquerque; E. S. Stover, Albuquerque; Juan C. Armijo and F. W. Clancy, Albuquerque; H. L. Waldo, Las Vegas, N. Mex.

New Mexico College of Agriculture and Mechanic Arts.—Regents: G. A. Richardson, Roswell; A. A. Jones, Las Vegas; P. H. Curran, Lascruces; R. E. Twitchell, Las Vegas, and L. Bradford Prince, Santa Fe, N. Mex.

The New Mexico Normal School, Silver City.—Regents: J. W. Fleming, Silver City; W. G. Ritch, Engle; J. A. Mahoney, Deming; Jo E. Sheridan, Silver City, and C. F. Grayson, Silver City, N. Mex.

Normal University of New Mexico at Las Vegas.—Regents: A. B. Smith, Las Vegas; Charles Ilfeld, Las Vegas; M. W. Browne, Las Vegas; Frank Springer, Las Vegas, and Rev. George Selby, Las Vegas, N. Mex.

New Mexico School of Mines, Socorro.—Trustees: J. P. McGrorty, Deming; Joseph E. Smith, Socorro; Juan Jose Baca, Socorro; F. G. Bartlett, Magdalena, and C. T. Brown, Socorro, N. Mex.

New Mexico Military Institute, Roswell.—Regents: Joseph C. Lea, Roswell; Nathan Jaffa, Roswell; J. O. Cameron, Eddy; Charles Wilson, Roswell; Robert S. Hamilton, Roswell, N. Mex.

New Mexico Insane Asylum, Las Vegas.—Directors: O. L. Gregory, East Las Vegas; M. Brunswick, Las Vegas; J. W. Zollars, Las Vegas; Benigno Romero, Las Vegas, and N. T. Cordova, Las Vegas, N. Mex.

Territorial board of education.—Members: Governor, superintendent of public instruction, president of St. Michael's College at Santa Fe, president of the University of New Mexico, president of the New Mexico College of Agriculture, Lascruces, N. Mex.

Board of penitentiary commissioners.—F. H. Pierce, San Miguel County; Juan Navarro, Mora County; J. T. McLaughlin, Santa Fe County; J. Francisco Chaves of Valencia County; Louis Baer of Bernalillo County.

Capitol custodian committee.—Secretary of the Territory, ex officio, Santa Fe; Solomon Spiegleberg, Santa Fe, and Alfredo Hinojos, Santa Fe, N. Mex.

Territorial board of equalization.—First judicial district, Venceslao Jaramillo, Rio Arriba County; second judicial district, Alejandro Sandoval, Bernalillo County; third judicial district, Numa Reymond, Donna Ana County; fourth judicial district, James S. Duncan, San Miguel County; fifth judicial district, John W. Poe, Chaves County.

Cattle sanitary board.—James F. Hinkle, Chaves County; William H. Jack, Grant County; E. C. Austen, Mora County; M. N. Chaffin, San Miguel County; Malaquias Martinez, Taos County, N. Mex.

Board of medical examiners.—G. S. Easterday, Bernalillo County; W. Eggert, Santa Fe County; J. H. Sloan, Santa Fe County; Joseph Cunningham, San Miguel County; W. R. Tipton, San Miguel County; T. P. Martin, Taos County, and George C. Bryan, of Otero County.

Board of dental examiners.—B. M. Williams, of San Miguel County; D. W. Manley, Santa Fe; L. H. Chamberlain of Bernalillo; W. H. White, of Grant County, and A. A. Bearup, of Chaves County.

Members of board of pharmacy.—A. J. Fischer, Santa Fe County; W. C. Porterfield, Silver City; B. Ruppe, Albuquerque; E. G. Murphy, Las Vegas, and P. Moreno, Lascruces.

Sheep sanitary board.—Solomon Luna, of Valencia County; W. S. Prager, of Chaves County, and Henry W. Kelly, of San Miguel County.

Members of bureau of immigration.—L. Bradford Prince, Santa Fe; Felipe Chavez, Belen; W. A. Hawkins, Alamogordo; Frank Springer, Las Vegas; A. C. Campbell, Eddy, N. Mex.

Members of the board of the Deaf and Dumb Asylum.—Benjamin M. Reed, Mrs. T. P. Gable, Mrs. F. P. Crichton, and F. Muller.

Register of the thirty-third legislative assembly.

COUNCIL.

President of the council: J. FRANCISCO CHAVES.

Politics.	Members.	Post-office.	District, by counties.
D.	J. M. Valdez	Springer	Colfax, Mora, Union.
R.	J. S. Duncan	East Las Vegas	San Miguel, Guadaloupe.
R.	Eugenio Romero	Las Vegas	Do.
R.	T. D. Burns	Parkview	Taos, Rio Arriba, and San Juan.
R.	Malaquias Martinez	Taos	Do.
R.	T. B. Catron	Santa Fe	Santa Fe.
R.	T. A. Finical	Albuquerque	Bernalillo.
R.	Thomas Hughes	do	Do.
R.	J. F. Chaves	Progresso	Valencia.
R.	H. O. Bursum	Socorro	Socorro and Sierra.
R.	J. A. Ancheta	Silver City	Donna Ana and Grant.
D.	G. A. Richardson	Roswell	Donna Ana, Grant, Chaves, Lincoln, and Eddy.

HOUSE OF REPRESENTATIVES.

Speaker of the house: MAXIMILIANO LUNA.

D.	T. B. Leib	Raton	Colfax.
R.	Bernardo A. Romero	Watrous	Mora.
R.	John R. Guyer	Clayton	Union.
R.	Rafael Gallegos	Las Vegas	San Miguel.
R.	Wm. H. Schultz	East Las Vegas	Do.
R.	Ramon de Herrera	Rociada	Do.
R.	Celso Baca	Eden	Guadaloupe.
R.	Victor Ortega	Chimayo	Santa Fe.
R.	Wm. Kilpatrick	Madrid	Do.
R.	Pedro Sanchez	Taos	Taos.
R.	V. Jaramillo	El Rito	Rio Arriba.
R.	Frank Staplin	Taos	Taos, Rio Arriba, and San Juan.
R.	A. D. McIntosh	Cedar Hill	Do.
R.	Pablo Crespin	Albuquerque	Bernalillo.
R.	Marcelino Baca	Pena Blanca	Do.
R.	E. Guttierrez	Old Albuquerque	Do.
R.	Max. Luna	Los Lunas	Valencia.
R.	Roman A. Baca	San Mateo	Do.
R.	Pablo Trujillo	Polvadera	Socorro and Sierra.
R.	F. H. Winston	Fairview	Do.
R.	Marcial Valdez	Lascruces	Donna Ana.
R.	R. P. Barnes	Silver City	Grant.
R.	W. H. H. Llewellyn	Lascruces	Donna Ana and Grant.
D.	J. E. Wharton	White Oaks	Lincoln, Chaves, and Eddy.

POPULATION.

It is impossible for me to give anything like a correct count of the population of the Territory, and what I do give is based only on such information as I am able to gather from prominent residents of the different counties.

The census supervisor will soon begin his work in this Territory,

and I trust to be able to give an accurate account of our population in my next report.

From information which I have received in response to numerous inquiries addressed to all parts of the Territory, with a view of ascertaining as near as possible the present population, I find that the greatest gain in population was made in the principal cities, counties that are building and extending new lines of railroad, and the mining districts of the Territory. There has also been quite an influx of new residents to the following counties: San Juan, Colfax, Lincoln, Eddy, Chavez, Grant, and Otero.

The mining districts of New Mexico continue to hold out attractive allurements to prospectors, the mining industry having received a great impetus in the districts of Cochiti, Santa Rita, Hanover, San Pedro, Red River City, Elizabethtown, Amizett, Golden, Water Canon, Jarilla, San Andres, Hillsboro, White Oaks, and, in fact, every mining district in the Territory.

The construction of irrigating ditches and reservoirs in the arid regions is reclaiming vast areas and preparing them for cultivation. The home seeker, coming from the more densely populated North and East, finds the conditions so favorable to the production of fruits and grains that each year he induces more and more of his neighbors from his old home to follow his example and take up the new lands of New Mexico, and convert them into homes.

The following estimate of the population, by counties, is as nearly correct as it is possible for me to make it from the limited means of information in my possession, to wit:

Bernalillo	35,000
Chavez	5,000
Colfax	14,000
Dona Ana	12,000
Eddy	4,000
Grant	15,000
Guadalupe	7,500
Lincoln	9,000
Mora	17,000
Otero	3,500
Rio Arriba	19,000
Santa Fe	21,000
San Miguel	35,000
San Juan	5,000
Sierra	5,500
Socorro	19,000
Taos	13,000
Union	7,000
Valencia	14,000
Total	260,500

The Indian population is estimated as follows:

Pueblos	9,047
Jicarillas	832
Mescaleros	450
Navajos (Arizona and New Mexico)	15,000
Total	25,329

This makes a total population of the Territory, as estimated, of 285,829.

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R.	Malaquias Martinez	Taos	Do.
R.	T. B. Catron	Santa Fe	Santa Fe.
R.	T. A. Finical	Albuquerque	Bernalillo.
R.	Thomas Hughes	do	Do.
R.	J. F. Chaves	Progresso	Valencia.
R.	H. O. Bursum	Socorro	Socorro and Sierra.
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R.	Ramon de Herrera	Rociada	Do.
R.	Celso Baca	Eden	Guadaloupe.
R.	Victor Ortega	Chimayo	Santa Fe.
R.	Wm. Kilpatrick	Madrid	Do.
R.	Pedro Sanchez	Taos	Taos.
R.	V. Jaramillo	El Rito	Rio Arriba.
R.	Frank Staplin	Taos	Taos, Rio Arriba, and San Juan.
R.	A. D. McIntosh	Cedar Hill	Do.
R.	Pablo Crespin	Albuquerque	Bernalillo.
R.	Marcelino Baca	Pena Blanca	Do.
R.	E. Guttierrez	Old Albuquerque	Do.
R.	Max. Luna	Los Lunas	Valencia.
R.	Roman A. Baca	San Mateo	Do.
R.	Pablo Trujillo	Polvadera	Socorro and Sierra.
R.	F. H. Winston	Fairview	Do.
R.	Marcial Valdez	Lascruces	Donna Ana.
R.	R. P. Barnes	Silver City	Grant.
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The census supervisor will soon begin his work in this Territory,

This is a comparison with the best in the extreme East. Now let us see what showing the two Territories make when compared with some of the sovereign States of the imperial West. Idaho, 15; Montana, 30; North Dakota, 13; South Dakota, 9; Nevada, 2; Wisconsin, 98. Total, 167, or just 44 less than that furnished by New Mexico and Arizona, whose people are "incapable of self-government." The States above mentioned have twelve United States Senators and sixteen members of the national House of Representatives. New Mexico and Arizona have two Delegates in Congress, without the right to vote on any question, because they represent constituents "incapable of self-government."

Why not statehood, then?

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The organization of civil government in the Territory of New Mexico was unique. The organic act establishing the Territory was approved September 30, 1850; the ratification of the treaty of peace between the United States and Mexico was held May 30, 1848, and proclamation thereof made July 4, 1848, just fifty years earlier than the capture of Santiago. But two years prior to that time the United States Government had established through its military authority a complete code of civil laws for the future Territory of New Mexico, which, at that time, consisted of the present Territory, all of Arizona, and the southern half of Colorado. On the 22d day of September, 1846, Brig. Gen. S. W. Kearney, in command of the army of invasion, issued and proclaimed to the people a "bill of rights," which is still retained on the statutes unchanged. On the same day he proclaimed "the Kearney Code," which was reenacted by the legislature in 1865 and nearly all the provisions of which are still in force; and on the same day by

STATEHOOD.

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The admission of New Mexico to the sisterhood of States would be beneficial alike to her people and the Federal Government. Self-government, which carries with it to every citizen the right to participate in the selection of the various officers intrusted with the management of the government, is a privilege few American citizens would willingly be deprived of, and one that all eagerly seek. Self-government would not only relieve the Federal Government of the enormous expense it is subjected to in the management of the present Territorial form of government, but would also relieve it of the responsibility of selecting the officers to manage the Territory's affairs.

Since that time our assessed value for taxation has increased and it is now more than $40,000,000, and constantly growing, while the population, caused by immigration, is also increasing rapidly. New Mexico sold more than 18,000,000 pounds of wool this year, which is 3,000,000 pounds more than ever before in her history, while her mines of copper and gold are being developed in a manner never known before. More capital has been invested in their development during the past year than previously, especially in Grant, Otero, Bernalillo, and Santa Fe counties. In this connection I quote the following from a Washington correspondent of the St. Louis Globe-Democrat.

WASHINGTON, D. C., *September 11.*

The War Department to-day made public the figures on the enlistments for the first ten regiments. Massachusetts furnished 833, which is the best showing, in proportion to population. The figures for Western and Southwestern States are as follows: Missouri, 639; Arkansas, 122; Colorado, 316; Illinois, 1,161; Indiana, 654; Iowa, 192; Kansas, 415; Texas, 548; Mississippi, 42; Nebraska, 171; Tennessee, 567; Arizona, 90; New Mexico, 121; Oklahoma, 124; Indian Territory, 109.

The Northwestern States made a very bad showing. Wisconsin furnished but 98 men; Idaho, 15; Minnesota, 122; Montana, 30; North Dakota, 13; Oregon 80; South Dakota, 9. This is a total of 367 men for all the Northwestern States. Georgia alone furnished 446, and Texas 435. The smallest number of recruits secured from any one State was two, from Nevada.

Missouri's showing was one of the best, considering the fact that no regiment of the first ten were rendezvoused there. The reports of recruiting for the ten regiments now being organized show that the Thirty-eighth, now being recruited at Jefferson Barracks, by Colonel Anderson, leads all the rest, with 485 men to its credit up to date. The nearest approach to this showing is made by the Forty-second Regiment, which is being organized at Fort Niagara, N. Y. The number of men secured for this regiment to date is 339. The total number of recruits secured for the ten new regiments to date is 4,790.

There is a slight error in the above article, where it is stated that "Massachusetts furnished 833, which is the best showing in proportion to population." This is not true for both New Mexico and Arizona did much better in proportion to the number of their people. New Mexico sent 121 and Arizona 90, or a total of 211. The census of 1890 gives Arizona's population as 59,696; New Mexico's 153,593, and Massachusetts' 2,238,943. New Mexico and Arizona, then, with a combined population of 213,289, or less than one-tenth of that of Massachusetts, furnished over one-fourth of the number sent by the State of the Pilgrim Fathers, of Adams, Webster, and Hoar.

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virtue of his authority as brigadier-general, he appointed the following list of civil officers: Charles Bent, to be governor; Donaciano Vigil, to be secretary; Richard Dallam, to be marshal; Frank P. Blair, to be United States district attorney; Charles Blumner, to be treasurer; Eugene Leitzendorfer, to be auditor of public accounts; and Joab Houghton, Antonio Jose Otero, and Charles Beaubian, to be judges of the superior court. In his letter transmitting to the Adjutant-General a copy of these laws and list of appointments, General Kearney made the following statement:

I take great pleasure in stating that I am entirely indebted for these laws to Col. A. W. Doniphan, of the First Regiment of Missouri Mounted Volunteers, who received much assistance from Private Willard P. Hall of his regiment. These laws are taken, part from the laws of Mexico, retained as in the original, a part with such modifications as our laws and Constitution made necessary; a part are from the laws of Missouri Territory, and a part from the laws of Texas, and also of Texas and Coahuila, a part from the statutes of Missouri, and the remainder from the Livingston code.

The first governor, Bent, was assassinated the year after his appointment, at the pueblo of Taos, during what is known as the "Taos rebellion," which was suppressed with considerable loss of life by United States troops, out of which rebellion arose a number of prosecutions for treason, conducted by Frank P. Blair, United States attorney.

The civil law and the Kearney Code remained the rules of civil action down to 1876, when, by statute, the "common law as recognized in the United States of America" was adopted. This was the law of the land until the legislature of 1897 adopted a code of civil procedure.

The first legislative assembly of the Territory of New Mexico assembled in Santa Fe in December, 1847. The laws passed at that session were printed in a pamphlet, to which was added "Order No. 10," from the Headquarters of the Ninth Military Department, imposing a duty of 6 per centum on merchandise imported into the Territory. The authorization of these laws is printed in the same pamphlet, as follows:

SPECIAL ORDER, No. 5. } HEADQUARTERS NINTH MILITARY DEPARTMENT, *Santa Fe, N. Mex., February 5, 1848.*

The foregoing legislative enactments of the Territory of New Mexico, having been duly reviewed by the commanding general of the Territory, they are hereby approved, and they will be duly observed.

By order of brigadier-general,

STERLING PRICE.

W. E. PRINCE,
Aide-de-Camp and Acting Assistant Adjutant-General.

The first section of the General Orders No. 10, referred to on the title page of the laws, is as follows:

On and after the 1st day of February, 1848, the following regulations will govern the civil and military officers in the discharge of their respective duties: First, the officers named in the statutes as secretary of Territory, United States district attorney, and United States marshal are hereby abolished.

It is believed the above résumé of the methods of introducing American laws into conquered Spanish territory may be of interest at this time when similar conditions exist which may require similar action on the part of the Government.

OFFICE OF THE BOARD OF PUBLIC LANDS,
Santa Fe, N. Mex., September 5, 1899.

SIR: I have the honor to submit herewith a special report as commissioner of public lands of the Territory of New Mexico.

By an act of Congress, approved by the President June 21, 1898, certain grants of land for the benefit of the public schools of New Mexico and the higher educational institutions of the Territory, and for internal improvements, were made by the United States to the Territory of New Mexico.

For the support of the common schools, sections 16 and 36 in each township were so granted. This endowment, estimated at about 4,000,000 acres, or about equal to the area of Connecticut and Rhode Island together, which is large in size, is of comparatively little money value, as the greater part is arid land, only fit for grazing when rains develop the natural grasses, but with the development of water in New Mexico will become of greater value and productive of very beneficial results.

In addition, the United States is to pay to the Territory, for the support of the common schools, 5 per centum of the proceeds of the sales of public lands from and after the approval of the act of Congress, July 21, 1898. This money is to form a permanent fund, the interest of which alone is to be expended in support of our public schools.

For the support of higher educational institutions of the Territory, Congress made the following provisions: Lands to the extent of two townships in quantity are authorized to be reserved for the establishment of a university; in addition to the two townships, 65,000 acres of nonmineral, unappropriated, and unoccupied public land were granted, together with all saline lands in the Territory, for the use of said university.

For the Agricultural College of New Mexico, 100,000 acres are reserved and granted.

Congress also provided that the schools, colleges, and universities shall forever remain under the exclusive control of the Territory, and that no part of the proceeds arising from the sale or disposal of any lands granted for educational purposes, or income thereof, shall be used for the support of any sectarian or denominational school, college, or university.

In addition to the above, the following grants are made for the purposes mentioned:

	Acres.
Water reservoirs, for irrigating purposes	500,000
Improvement of the Rio Grande in New Mexico	100,000
Insane asylum	50,000
School of mines	50,000
Deaf and dumb asylum	50,000
Reform school	50,000
Normal schools	100,000
Institute for the blind	50,000
Miners' hospital	50,000
Military institute	50,000
Penitentiary	50,000
Total	1,100,000

It is well to state that this Territory has already established and in successful operation a university at Albuquerque, a military institute at Roswell, an agricultural college at Las Cruces, a school of mines at Socorro, and normal schools at Las Vegas and Silver City, and an institute for the deaf and dumb at Santa Fe. These institutions, being created by law during the past ten years, have been solely supported by direct taxation. The grants of land above described will place them on a firm foundation and will enable them to do the good intended.

A commission was created to select these lands in quantity as indemnity, as provided by the act, which commission consists of the governor, surveyor-general, and the solicitor-general of New Mexico, acting as a commission, under the direction of the Secretary of the Interior.

The lands selected for agricultural and university purposes and sections 16 and 36 reserved for the common schools are to be leased for a term not to exceed five years, and are not for sale. The remainder of the lands granted may be leased or sold in such annual amounts as authorized by the Territorial legislature.

The thirty-third legislative assembly of New Mexico passed an act, which was approved by the governor of the Territory, March 16, 1899, prescribing regulations and rules to carry into effect the letter and spirit of the Congressional enactment granting the lands as heretofore indicated, the legislative enactment creating the board of public lands consisting of the governor, solicitor-general, and commissioner of public lands, for the management, lease, and sale of public lands, so generously granted by Congress.

The legislative enactment is very carefully drawn, and its provisions fully protect the interests of the educational institutions and public schools.

PHYSICAL CONFORMATION OF NEW MEXICO.

The topography of New Mexico is interesting, but complex. In shape a parallelogram, with an average breadth of 335 miles and length of 367, it lies, so to speak, broadside to the sun, sloping from north to south, with an elevation of 7,000 feet in the former, sinking down to 3,500 feet in the latter, while many mountain peaks reach a height varying from 8,000 to 13,000 feet. These peaks and their connecting ranges are so scattered as to form the Territory into five distinct watersheds with their respective valleys. The Rio Grande divides New Mexico from north to south into very nearly equal portions and is to this country what the Nile is to Egypt. On the northeast the Canadian outlets the waters of that section into a tributary of the Mississippi, while on the southeast the Pecos has eroded a valley second only in extent to that of the Rio Grande, of which it is the chief tributary. In the northwest the San Juan and in the southwest the Gila collect the waters ultimately reaching the Pacific Ocean.

Each of these main rivers has a vast number of affluent streams, so great in fact that New Mexico is more largely supplied with water courses than is any other mining State or Territory. Along each stream are valleys, beyond the valleys high table lands called mesas, and beyond these the mountain ranges proper. In the mountains and in many of these mesas are deep gorges or canyons with almost perpendicular walls. These collect the water from the melting snows and convey it to the streams ramifying it in all directions. Such, then, is the topography of the Territory. Mountain peaks and chains, high table lands, and lower lying valleys, falling away to the south, thus securing a southern exposure throughout its vast extent of 122,580 square miles, or an area of 100 square miles larger than the land surfaces of New England, New York, and Maryland combined or 1,241 square miles larger than all England, Scotland, Ireland, and Wales.

ABSENCE OF MOISTURE.

The aridity of New Mexico arises partly from her location, partly from her altitude, and partly from her topography. Her location is in the midst of the formerly so-called "Great American Desert," her borders about equidistant, or 500 miles each from the Gulf of Mexico and the Pacific Ocean at their nearest approach. The Gulf of California, at its northern extremity, lies some 150 miles closer, but its water surface is inconsiderable.

The low-lying plains east of the Rocky Mountains draw the moisture-laden winds from the Gulf of Mexico, causing them to pass eastward of this section, but at the same time drawing over the Territory the winds from the Pacific and from the Gulf of California. Before these can reach New Mexico, however, they must climb, height by height, the ascending plateaus of Arizona, culminating in the bald-faced peaks of the Continental Divide. All know that the warmer the air the more water it will hold; and, on the other hand, the more the air is chilled the more it parts with its moisture. Every succeeding altitude but wrings more water from the air, just as each stronger grip of the hand squeezes more water from the sponge. When these almost desiccated winds reach New Mexico only the mountain chains and peaks can draw further moisture from them, leaving the valleys and table-lands with but the scantiest of scant supplies. This is why the average rainfall in the valleys of this Territory will not exceed an

inch per month, two-thirds of the entire supply falling during the summer. Compare this with an average yearly precipitation at New York of 43 inches, Boston 45, Savannah 48, and the smallness of the rain supply will begin to be appreciated.

But altitude increases aridity by decreasing atmospheric pressure, and thus accelerating evaporation. The elevation of New Mexico averaging about 1 mile above sea level and reaching in the higher valleys to nearly 2 miles, it can be seen at once that water here most readily gives off its vapor. Especially is this true when taken in connection with the dry condition of the air and the almost ceaseless movements of the winds. The moisture that falls is immediately taken up into the air again. A snow of 2 or 3 inches in depth will pass away in a few hours, leaving the ground dry, having apparently returned into the air instead of melting. A refreshing shower in a day or two will have disappeared, leaving no mud behind. This is why any kind of a cloud is rare, and a day during some part of which the sun does not shine is almost unknown. Then, too, it must be remembered that the general slope of the country is on an average of about 10 feet to the mile, causing water, even in the streams (unless impounded), to run quickly away. For these reasons the humidity of the air in New Mexico averages about 36 per cent, while in New England it is 73 per cent, Florida 75 per cent, San Francisco 76 per cent, and the Gulf States 79 per cent.

RESOURCES OF NEW MEXICO.

FRUIT.

In the metropolitan markets of the Western States New Mexico's horticultural products command from 5 to 15 per cent greater price than the California products, owing to their size, richness in color, and peculiarly delicate flavor. In grapes, for which the Rio Grande Valley is famous, the Flame Tokay, the Muscats, the Black Hamburgs, and similar choice varieties are grown to perfection. In every quarter of the Territory are profitable orchards of apples, pears, peaches, cherries, plums, nectarines, and all the small fruits indigenous to the temperate and semitropic zones.

SUGAR BEETS.

Experiments covering a period of three years demonstrate that New Mexico excels any other country or section in the world in the quantity and quality of sugar beets. In 1896 in the Pecos Valley some 1,400 acres of beets were harvested. The average yield per acre was a little over 16 tons, and the average percentage of saccharine matter was over 16, the highest record ever made. The gross returns to the farmer averaged $67 per acre, and the cost of raising the crop was a little less than $22 per acre. The almost perpetual sunshine during the growing season is the cause of the extra percentage of sugar in the beets, and the richness and adaptability of the soil accounts for the heavy yield.

CEREALS AND VEGETABLES

Of innumerable variety are profitably produced in New Mexico. The latter are notable for size and flavor, as well as their keeping qualities. Rio Grande Valley oats took the second prize at the World's Fair. Every field crop and all classes of vegetables can be and are grown with success and profit.

MINERALS.

It is no exaggeration to affirm that, in point of natural resources, none of the peerless Rocky Mountain States exceed New Mexico. Gold, silver, copper, iron, zinc, lead, mica, coal (anthracite and bituminous), marble, fire clay, alum, sulphur, soda, salt, asphalt, gypsum, etc., are found in paying quantities in almost every county in the Territory. In many localities are valuable deposits of onyx, while the turquois supply of the world is largely furnished by the New Mexico mines.

TIMBER AND COAL.

These essentials to the home seeker are plentiful and cheap in New Mexico. Tracts of virgin forest, large or small, may be purchased now at astonishingly low figures, since the United States court has rendered such timely service in settling titles to the land grants.

MINERAL SPRINGS.

The attention of the tourist and health seeker is especially invited to the number and varied character of the mineral waters in New Mexico. These are easily accessible by rail, and offer every reasonable accommodation to the visitor. Among such resorts are the Las Vegas Hot Springs, the Jemez Hot Springs, the Ojo Caliente Hot Springs, Hudson Hot Springs, the Sulphur Hot Springs, the Macbeth, Taylor, and Coyote mineral waters.

DESIRABLE LANDS.

New Mexico contains nearly 79,000,000 acres. Of these there are about 24,000,000 acres contained in land grants, Indian and military reservations, railroad grants, and Government entries, which leaves available an area of about 55,000,000 acres of land, capable of supporting an immense population running up into the millions.

Thousands of acres of wild lands are to be had by complying with the United States land laws, much of which is contiguous to water and is desirable for colonization purposes when ditches and water-storage reservoirs are provided. The land-grant question is no longer a bugaboo in New Mexico, and through the action of the land court titles to vast tracts have been cleared up and settled. Some millions of acres have been confirmed by the courts to private ownership, while, on the other hand, an equal acreage has been rejected, so far as the grant claimants are concerned, and the land added to the public domain, subject to entry.

OFFICIAL REGISTER.

Territorial officers.—Governor of the Territory of New Mexico, Miguel A. Otero, Las Vegas, N. Mex.; private secretary to governor, Miss N. P. Crane, Santa Fe, N, Mex.; secretary of the Territory, George H. Wallace; clerk in secretary's office, C. P. Wallace; solicitor-general, Edward L. Bartlett; auditor, Luis M. Ortiz; treasurer, J. H. Vaughn; superintendent of Territorial penitentiary, H. O. Bursum; superintendent of public instruction, Manuel C. de Baca; librarian, Judge Lafayette Emmett; adjutant-general, William H, Whiteman; mine inspector, J. W. Fleming; coal-oil inspector, John S. Clark.

Judiciary.—Chief justice of the supreme court and judge of the fourth judicial district, William J. Mills; clerk, Secundino Romero; clerk of the supreme court, José D. Sena. Associate justices of the supreme court—first judicial district, John R. McFie; clerk, A. M. Bergere; judge second judicial district, J. W. Crumpacker;

clerk, H. P. Owen; judge third judicial district, Frank W. Parker; clerk, J. P. Mitchell; judge of the fifth judicial district, Charles Leland; clerk, John E. Griffith.

Delegate in Congress.—Pedro Perea.

Surveyor-general.—Quinby Vance.

United States revenue collector.—A. L. Morrison.

United States district attorney.—W. B. Childers.

United States marshal.—C. M. Foraker.

Deputy United States marshal.—C. A. Coddington.

Registers and receivers land offices.—M. R. Otero, register, and Edward F. Hobart, receiver, Santa Fe; Emile Solignac, register, and H. D. Bowman, receiver, Lascruces; Howard Leland, register, and George R. Guyer, receiver, Roswell; Edward Fox, register, and A. W. Thompson, receiver, Folsom, N. Mex.

District attorneys.—R. C. Gortner, Santa Fe; W. H. H. Llewellyn, Dona Ana and Otero counties; T. A. Finical, Albuquerque; R. D. Barnes, Silver City; Charles A. Spiess, Las Vegas; A. J. Nesbit, Roswell; S. Alexander, Socorro; J. Leah, Raton, N. Mex.

Public printer.—J. D. Hughes.

Indian agent.—N. S. Walpole.

Court of private land claims.—Chief justice, Joseph R. Reed; justices, W. W. Murray, Henry S. Sluss, Thomas C. Fuller, and Wilber Stone; attorney, Matthew C. Reynolds; clerk, J. H. Reeder.

Officers of Territorial institutions.—The governor and superintendent of public instruction are the ex officio members of the board of regents of the following institutions: The University of New Mexico, the New Mexico College of Agriculture and Mechanic Arts, the New Mexico School of Mines, the New Mexico Insane Asylum, and the New Mexico Military Institute.

The University of New Mexico.—Regents: J. H. Wroth, Albuquerque; E. S. Stover, Albuquerque; Juan C. Armijo and F. W. Clancy, Albuquerque; H. L. Waldo, Las Vegas, N. Mex.

New Mexico College of Agriculture and Mechanic Arts.—Regents: G. A. Richardson, Roswell; A. A. Jones, Las Vegas; P. H. Curran, Lascruces; R. E. Twitchell, Las Vegas, and L. Bradford Prince, Santa Fe, N. Mex.

The New Mexico Normal School, Silver City.—Regents: J. W. Fleming, Silver City; W. G. Ritch, Engle; J. A. Mahoney, Deming; Jo E. Sheridan, Silver City, and C. F. Grayson, Silver City, N. Mex.

Normal University of New Mexico at Las Vegas.—Regents: A. B. Smith, Las Vegas; Charles Ilfeld, Las Vegas; M. W. Browne, Las Vegas; Frank Springer, Las Vegas, and Rev. George Selby, Las Vegas, N. Mex.

New Mexico School of Mines, Socorro.—Trustees: J. P. McGrorty, Deming; Joseph E. Smith, Socorro; Juan Jose Baca, Socorro; F. G. Bartlett, Magdalena, and C. T. Brown, Socorro, N. Mex.

New Mexico Military Institute, Roswell.—Regents: Joseph C. Lea, Roswell; Nathan Jaffa, Roswell; J. O. Cameron, Eddy; Charles Wilson, Roswell; Robert S. Hamilton, Roswell, N. Mex.

New Mexico Insane Asylum, Las Vegas.—Directors: O. L. Gregory, East Las Vegas; M. Brunswick, Las Vegas; J. W. Zollars, Las Vegas; Benigno Romero, Las Vegas, and N. T. Cordova, Las Vegas, N. Mex.

Territorial board of education.—Members: Governor, superintendent of public instruction, president of St. Michael's College at Santa Fe, president of the University of New Mexico, president of the New Mexico College of Agriculture, Lascruces, N. Mex.

Board of penitentiary commissioners.—F. H. Pierce, San Miguel County; Juan Navarro, Mora County; J. T. McLaughlin, Santa Fe County; J. Francisco Chaves of Valencia County; Louis Baer of Bernalillo County.

Capitol custodian committee.—Secretary of the Territory, ex officio, Santa Fe; Solomon Spiegleberg, Santa Fe, and Alfredo Hinojos, Santa Fe, N. Mex.

Territorial board of equalization.—First judicial district, Venceslao Jaramillo, Rio Arriba County; second judicial district, Alejandro Sandoval, Bernalillo County; third judicial district, Numa Reymond, Donna Ana County; fourth judicial district, James S. Duncan, San Miguel County; fifth judicial district, John W. Poe, Chaves County.

Cattle sanitary board.—James F. Hinkle, Chaves County; William H. Jack, Grant County; E. C. Austen, Mora County; M. N. Chaffin, San Miguel County; Malaquias Martinez, Taos County, N. Mex.

Board of medical examiners.—G. S. Easterday, Bernalillo County; W. Eggert, Santa Fe County; J. H. Sloan, Santa Fe County; Joseph Cunningham, San Miguel County; W. R. Tipton, San Miguel County; T. P. Martin, Taos County, and George C. Bryan, of Otero County.

STATEHOOD.

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The admission of New Mexico to the sisterhood of States would be beneficial alike to her people and the Federal Government. Self-government, which carries with it to every citizen the right to participate in the selection of the various officers intrusted with the management of the government, is a privilege few American citizens would willingly be deprived of, and one that all eagerly seek. Self-government would not only relieve the Federal Government of the enormous expense it is subjected to in the management of the present Territorial form of government, but would also relieve it of the responsibility of selecting the officers to manage the Territory's affairs.

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WASHINGTON, D. C., *September 11.*

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The Northwestern States made a very bad showing. Wisconsin furnished but 98 men; Idaho, 15; Minnesota, 122; Montana, 30; North Dakota, 13; Oregon 80; South Dakota, 9. This is a total of 367 men for all the Northwestern States. Georgia alone furnished 446, and Texas 435. The smallest number of recruits secured from any one State was two, from Nevada.

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There is a slight error in the above article, where it is stated that "Massachusetts furnished 833, which is the best showing in proportion to population." This is not true for both New Mexico and Arizona did much better in proportion to the number of their people. New Mexico sent 121 and Arizona 90, or a total of 211. The census of 1890 gives Arizona's population as 59,696; New Mexico's 153,593, and Massachusetts' 2,238,943. New Mexico and Arizona, then, with a combined population of 213,289, or less than one-tenth of that of Massachusetts, furnished over one-fourth of the number sent by the State of the Pilgrim Fathers, of Adams, Webster, and Hoar.

This is a comparison with the best in the extreme East. Now let us see what showing the two Territories make when compared with some of the sovereign States of the imperial West. Idaho, 15; Montana, 30; North Dakota, 13; South Dakota, 9; Nevada, 2; Wisconsin, 98. Total, 167, or just 44 less than that furnished by New Mexico and Arizona, whose people are "incapable of self-government." The States above mentioned have twelve United States Senators and sixteen members of the national House of Representatives. New Mexico and Arizona have two Delegates in Congress, without the right to vote on any question, because they represent constituents "incapable of self-government." Why not statehood, then?

Under the treaty of peace concluded between the United States and Mexico, February 2, 1848, known as the "Treaty of Guadalupe-Hidalgo," it was provided that "the territory acquired by the Mexican war and under that treaty should be incorporated in the union of the United States, and be admitted at the proper time (to be judged by the Congress of the United States) to the enjoyment of all the rights of citizens of the United States according to the principles of the Constitution." Since that time, California and Colorado have been admitted, and New Mexico and Arizona (which was formerly a county of this territory) have been refused that privilege, and, I might say, right. For fifty years the Territory, through its legislature, and by the recommendations of its governors, has been asking for this recognition guaranteed by solemn treaty stipulations. As long ago as 1850 New Mexico adopted a State constitution and elected a governor and two United States Senators, and its admission was only prevented by the adoption of the celebrated "compromise measures of that year." Twenty years afterwards it held a constitutional convention which formulated a most admirable constitution. In 1876 a bill to admit it to Statehood, together with Colorado, passed both Houses of Congress, and only failed to become a law by nonconcurrence in an amendment to that bill. Again, in 1889, there was a constitutional convention, lasting nearly a month, composed of men of the highest character and ability, and their labors resulted in the presentation of a constitution which I have no hesitation in saying was the best formulated in the United States. Copies were laid before both Houses of Congress, and several bills were introduced for its admission; and since that time each session of Congress has seen bills introduced by members of both political parties for the admission of New Mexico as a State, which have so far failed, and for which failure no good reason has been given. Another bill for this purpose will be introduced at the coming session of Congress, and I urge its earnest consideration in behalf of the quarter of a million people of this Territory.

The organization of civil government in the Territory of New Mexico was unique. The organic act establishing the Territory was approved September 30, 1850; the ratification of the treaty of peace between the United States and Mexico was held May 30, 1848, and proclamation thereof made July 4, 1848, just fifty years earlier than the capture of Santiago. But two years prior to that time the United States Government had established through its military authority a complete code of civil laws for the future Territory of New Mexico, which, at that time, consisted of the present Territory, all of Arizona, and the southern half of Colorado. On the 22d day of September, 1846, Brig. Gen. S. W. Kearney, in command of the army of invasion, issued and proclaimed to the people a "bill of rights," which is still retained on the statutes unchanged. On the same day he proclaimed "the Kearney Code," which was reenacted by the legislature in 1865 and nearly all the provisions of which are still in force; and on the same day by

STATEHOOD.

I would most earnestly renew my recommendation, made in my last report, with reference to the early admission of New Mexico as a State of the Union. The reasons given at that time for such admission are stronger now by reason of increased population, wealth, and intelligence. In that report I stated:

It is unnecessary here to repeat the arguments which demonstrate conclusively that New Mexico is entitled to statehood. Her sheep and cattle industries, as already reviewed herein, her mineral wealth, her agricultural advantages, all stand as a guaranty that the new State of New Mexico will be amply able to meet the obligations which necessarily will be incurred in the change of government and her ability to sustain her own government permanently.

The admission of New Mexico to the sisterhood of States would be beneficial alike to her people and the Federal Government. Self-government, which carries with it to every citizen the right to participate in the selection of the various officers intrusted with the management of the government, is a privilege few American citizens would willingly be deprived of, and one that all eagerly seek. Self-government would not only relieve the Federal Government of the enormous expense it is subjected to in the management of the present Territorial form of government, but would also relieve it of the responsibility of selecting the officers to manage the Territory's affairs.

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virtue of his authority as brigadier-general, he appointed the following list of civil officers: Charles Bent, to be governor; Donaciano Vigil, to be secretary; Richard Dallam, to be marshal; Frank P. Blair, to be United States district attorney; Charles Blumner, to be treasurer; Eugene Leitzendorfer, to be auditor of public accounts; and Joab Houghton, Antonio Jose Otero, and Charles Beaubian, to be judges of the superior court. In his letter transmitting to the Adjutant-General a copy of these laws and list of appointments, General Kearney made the following statement:

I take great pleasure in stating that I am entirely indebted for these laws to Col. A. W. Doniphan, of the First Regiment of Missouri Mounted Volunteers, who received much assistance from Private Willard P. Hall of his regiment. These laws are taken, part from the laws of Mexico, retained as in the original, a part with such modifications as our laws and Constitution made necessary; a part are from the laws of Missouri Territory, and a part from the laws of Texas, and also of Texas and Coahuila, a part from the statutes of Missouri, and the remainder from the Livingston code.

The first governor, Bent, was assassinated the year after his appointment, at the pueblo of Taos, during what is known as the "Taos rebellion," which was suppressed with considerable loss of life by United States troops, out of which rebellion arose a number of prosecutions for treason, conducted by Frank P. Blair, United States attorney.

The civil law and the Kearney Code remained the rules of civil action down to 1876, when, by statute, the "common law as recognized in the United States of America" was adopted. This was the law of the land until the legislature of 1897 adopted a code of civil procedure.

The first legislative assembly of the Territory of New Mexico assembled in Santa Fe in December, 1847. The laws passed at that session were printed in a pamphlet, to which was added "Order No. 10," from the Headquarters of the Ninth Military Department, imposing a duty of 6 per centum on merchandise imported into the Territory. The authorization of these laws is printed in the same pamphlet, as follows:

SPECIAL ORDER, No. 5. } HEADQUARTERS NINTH MILITARY DEPARTMENT, *Santa Fe, N. Mex., February 5, 1848.*

The foregoing legislative enactments of the Territory of New Mexico, having been duly reviewed by the commanding general of the Territory, they are hereby approved, and they will be duly observed.

By order of brigadier-general,

STERLING PRICE.

W. E. PRINCE,
Aide-de-Camp and Acting Assistant Adjutant-General.

The first section of the General Orders No. 10, referred to on the title page of the laws, is as follows:

On and after the 1st day of February, 1848, the following regulations will govern the civil and military officers in the discharge of their respective duties: First, the officers named in the statutes as secretary of Territory, United States district attorney, and United States marshal are hereby abolished.

It is believed the above résumé of the methods of introducing American laws into conquered Spanish territory may be of interest at this time when similar conditions exist which may require similar action on the part of the Government.

OFFICE OF THE BOARD OF PUBLIC LANDS,
Santa Fe, N. Mex., September 5, 1899.

SIR: I have the honor to submit herewith a special report as commissioner of public lands of the Territory of New Mexico.

By an act of Congress, approved by the President June 21, 1898, certain grants of land for the benefit of the public schools of New Mexico and the higher educational institutions of the Territory, and for internal improvements, were made by the United States to the Territory of New Mexico.

For the support of the common schools, sections 16 and 36 in each township were so granted. This endowment, estimated at about 4,000,000 acres, or about equal to the area of Connecticut and Rhode Island together, which is large in size, is of comparatively little money value, as the greater part is arid land, only fit for grazing when rains develop the natural grasses, but with the development of water in New Mexico will become of greater value and productive of very beneficial results.

In addition, the United States is to pay to the Territory, for the support of the common schools, 5 per centum of the proceeds of the sales of public lands from and after the approval of the act of Congress, July 21, 1898. This money is to form a permanent fund, the interest of which alone is to be expended in support of our public schools.

For the support of higher educational institutions of the Territory, Congress made the following provisions: Lands to the extent of two townships in quantity are authorized to be reserved for the establishment of a university; in addition to the two townships, 65,000 acres of nonmineral, unappropriated, and unoccupied public land were granted, together with all saline lands in the Territory, for the use of said university.

For the Agricultural College of New Mexico, 100,000 acres are reserved and granted.

Congress also provided that the schools, colleges, and universities shall forever remain under the exclusive control of the Territory, and that no part of the proceeds arising from the sale or disposal of any lands granted for educational purposes, or income thereof, shall be used for the support of any sectarian or denominational school, college, or university.

In addition to the above, the following grants are made for the purposes mentioned:

	Acres.
Water reservoirs, for irrigating purposes	500,000
Improvement of the Rio Grande in New Mexico	100,000
Insane asylum	50,000
School of mines	50,000
Deaf and dumb asylum	50,000
Reform school	50,000
Normal schools	100,000
Institute for the blind	50,000
Miners' hospital	50,000
Military institute	50,000
Penitentiary	50,000
Total	1,100,000

It is well to state that this Territory has already established and in successful operation a university at Albuquerque, a military institute at Roswell, an agricultural college at Las Cruces, a school of mines at Socorro, and normal schools at Las Vegas and Silver City, and an institute for the deaf and dumb at Santa Fe. These institutions, being created by law during the past ten years, have been solely supported by direct taxation. The grants of land above described will place them on a firm foundation and will enable them to do the good intended.

A commission was created to select these lands in quantity as indemnity, as provided by the act, which commission consists of the governor, surveyor-general, and the solicitor-general of New Mexico, acting as a commission, under the direction of the Secretary of the Interior.

The lands selected for agricultural and university purposes and sections 16 and 36 reserved for the common schools are to be leased for a term not to exceed five years, and are not for sale. The remainder of the lands granted may be leased or sold in such annual amounts as authorized by the Territorial legislature.

The thirty-third legislative assembly of New Mexico passed an act, which was approved by the governor of the Territory, March 16, 1899, prescribing regulations and rules to carry into effect the letter and spirit of the Congressional enactment granting the lands as heretofore indicated, the legislative enactment creating the board of public lands consisting of the governor, solicitor-general, and commissioner of public lands, for the management, lease, and sale of public lands, so generously granted by Congress.

The legislative enactment is very carefully drawn, and its provisions fully protect the interests of the educational institutions and public schools.

The Federal commission to select public lands and the Territorial board of public lands to manage and dispose of them have organized and vigorously taken in hand the management of the trust. Already several hundred applications for the leasing of school land have been secured, at an annual rental ranging from 2 to 12 cents per acre. As soon as applications are approved and leases executed it is hoped that the amount of money to be realized from the leasing of these lands will be large.

It is already becoming apparent that the vast stock interests of the Territory, a fair estimate being about 1,500,000 head of cattle and 4,000,000 sheep, not to count horses, mules, and goats, will demand to lease at remunerative figures every acre of land that the Territory will have the right to lease.

In the matter of selling lands, the Territorial board of public lands is acting upon the principle that for the present only a small amount of the lands granted should be sold, sufficient at least to defray the United States land office fees. The selection should be made as rapidly as possible, in order to secure to the Territory the best lands available. Taking into consideration the willingness of the people of New Mexico to tax themselves for the support of the public schools and higher educational institutions, as shown by the records of the taxes assessed and collected since 1889, and the fact that the donations of land by Congress will within a few years bring in a revenue which will constantly grow, there can be no question but that the prospects for the educational and Territorial institutions are very bright.

With the growth and development of the Territory, which is apparent to the most casual observer, the demand for better schools grows apace. Better schools means a higher rate of taxation, but with the endowment of the public lands so generously granted by the Congressional act of June 21, 1898, and the income therefrom, which will become evident within a year or two, there will be no necessity to increase taxation in order to obtain better schools.

I would respectfully call your attention to section 10 of the Congressional act, which restricts the leasing of more than one section as well as the sale of more than one-quarter section of land to one person.

I earnestly recommend that we be relieved from these limitations, which, as they exist, are an obstacle and curtail the benefits that we expect to derive from the act. Six hundred and forty acres should be the minimum not the maximum acreage to any one person. Much of our lands are valuable only in large tracts, and available as such for grazing. There never was any good reason for such restrictions in the Southwest. The State of Colorado authorizes its board of land commissioners to lease any portion of the land of the State. I see no reason why we should be the exception.

The university lands should be subject to sale, thereby creating an available fund to extend the work of this worthy institution.

I would further recommend that part of section 6 of the Congressional act "The building known as the Old Palace in the city of Santa Fe" revert back to the Federal Government. This historical building is national, and should remain always under the care of the Government, and I might suggest as a western branch of the Smithsonian Institute.

Very respectfully, your obedient servant,

ALPHEUS A. KEEN,
Commissioner of Public Lands.

Governor M. A. OTERO,
Santa Fe, N. Mex.

PREHISTORIC TIMES.

Among the Pueblos the houses were communal as well as the lands, the building consisting of from two to five stories, each successive one receding several paces from the face of the one immediately below it, and each entered only from above by means of scaling ladders let down or taken up for that purpose. These edifices were constructed of adobe (sundried bricks), cobblestones held together by adobe mortar, or matched stone without mortar, the numerous rooms being ceiled with beams covered with earth. Each village or community usually contains two or three of these buildings, which looked more like fortresses than dwellings, though indeed designed for both purposes.

One such structure at Weqw gi was 700 feet in circumference and

PUEBLO OF TAOS.

contained 99 rooms. Pueblo Bonito was 544 feet long by 314 wide, with 300 apartments. The pueblo of Penasco Blanco was 1,700 feet long and comprised 112 rooms. Among the remains of the sacred city of Pecos are the ruins of the temple, which for ages preserved the holy fire of Montezuma. Its dimensions are 191 feet in length, 35 feet in breadth, and 50 feet in height, encompassed by walls 6 feet in thickness. The interior is divided in compartments, having cells, cisterns, and tanks, but the outworks and turrets are a mass of ruins.

The Taos pueblo, in the northern part of the Territory, is one of the finest specimens of these ancient dwellings to be found in modern use. There are two houses on opposite sides of a small stream, between 300 and 400 feet long by about 150 feet wide, anciently connected by a bridge. They are five and six stories high, terraced from bottom to top, divided into numerous compartments, with entrance to each story, as above mentioned, by ladders giving access to trapdoors in the roof. With these ladders drawn up at night and a sentinel stationed upon the house top to give notice of approaching danger, the peaceful Pueblos could sleep in security though surrounded by the marauding hordes of bloodthirsty Apaches, Navajos, and Utes. In these buildings at Taos live about 800 men, women, and children like one family, and in apparently the greatest harmony, occupying the identical abodes used by their forefathers for generations prior to the birth of Columbus, or that of his royal patrons.

Following is an interesting article upon a strange race of people known as the "cliff dwellers," long since vanished, but enough traces are left to make scientists eager for further investigation of what was once the home of this now extinct people.

CLIFF DWELLERS.

Very important explorations have lately been made in the Santa Clara Canyon in regard to the famous cliff dwellers, which are visited every year by hundreds of people. This party of explorers measured the communal building of the ancient and abandoned cliff dwellers, and found it to be 300 by 400 feet, three stories high, and containing approximately 2,000 rooms. They excavated two rooms and found the walls in good state of preservation, with some evidence of building skill. They discovered considerable pottery, beautifully decorated with geometrical designs and partly glazed, something unusual, as the pottery heretofore found was generally unglazed. Many turkey bones gave evidence that the ancient occupants knew the good points of the national bird; the turkey corrals were found to be small, and connected with the living rooms by a low archway only high enough for a turkey to slip through. In the two rooms pipes of an unusual shape were found. One was in imitation of a prickly pear, and the other of a cactus. There were evidences that the cliff dwellers grew tobacco, and the charred corn found proves that they also grew corn. There was evidence that the building had been deserted in haste, and that the cliff dwellers had left nearly everything behind them. The most important discovery, however, was that of nine skeletons almost complete. The skulls show that the cliff dwellers were not Indians, but were allied to the Caucasian race. The back of the skull is flat, but the forehead is well developed. The chin is strong, and the appearance of the face must have been long, slim, and intellectual. They had beautiful teeth, but, strange to say, instead of incisors they had grinders, which, according to the theory of evolution, is proof that

they were vegetarians for many ages before being driven out by invaders or by some calamity. One of the skulls had been pierced by an arrow on one side, while on the other it was fractured as if by a tomahawk. The man to whom it belonged had perhaps fallen while repelling an attack by the Indians. One femur measured 19½ inches, and the skeleton to which it belonged must have been between 7 and 8 feet high.

The burying places at Santa Clara have not been discovered yet, but it is known that the cliff dwellers were buried in a stooping position, with their heads between their knees and the feet pointing to a common center. Skulls were found with long red hair by this exploring party, and also monuments with inscriptions that resemble Chinese characters, while on the Gila River monuments were found that seemed to be of Egyptian origin. One well-known scientist in the party has made a study of the subject, and feels positive that the cliff dwellers belonged to another race than the Indian. It is believed that the cliff dwellings are from 1,500 to 2,000 years old, and that the Santa Clara settlement was abandoned on account of the eruptions of the crater, not far from here, which threw out the immense lava fields that cover large areas to the west of the city of Santa Fe. The relics found include instruments used for dressing hides; pottery, some of the pottery being very large; skeletons, and other remains of the cliff dwellers.

These discoveries prove that long before Columbus set foot on the shores of the New World, the valleys and plains of New Mexico were the seat of a civilization which has been the wonder of scientists and explorers; for ages unknown people contended for the possession of the lands and streams. Nation after nation of strange beings followed each other in conquest, and to-day, as above stated, evidences are to be found in the ancient settlements of their unknown inhabitants. The old pueblos in New Mexico are the homes of the descendants of the cliff dwellers, and the antiquarian will find enough of what is old beyond tradition, yet new to the nineteenth century, to keep him occupied for years in patient research. It is not necessary to go to Egypt or Persia to find ruins and relics of people who have passed from the face of the earth; they can be found right here in New Mexico and within easy reach of comfortable homes and hotels.

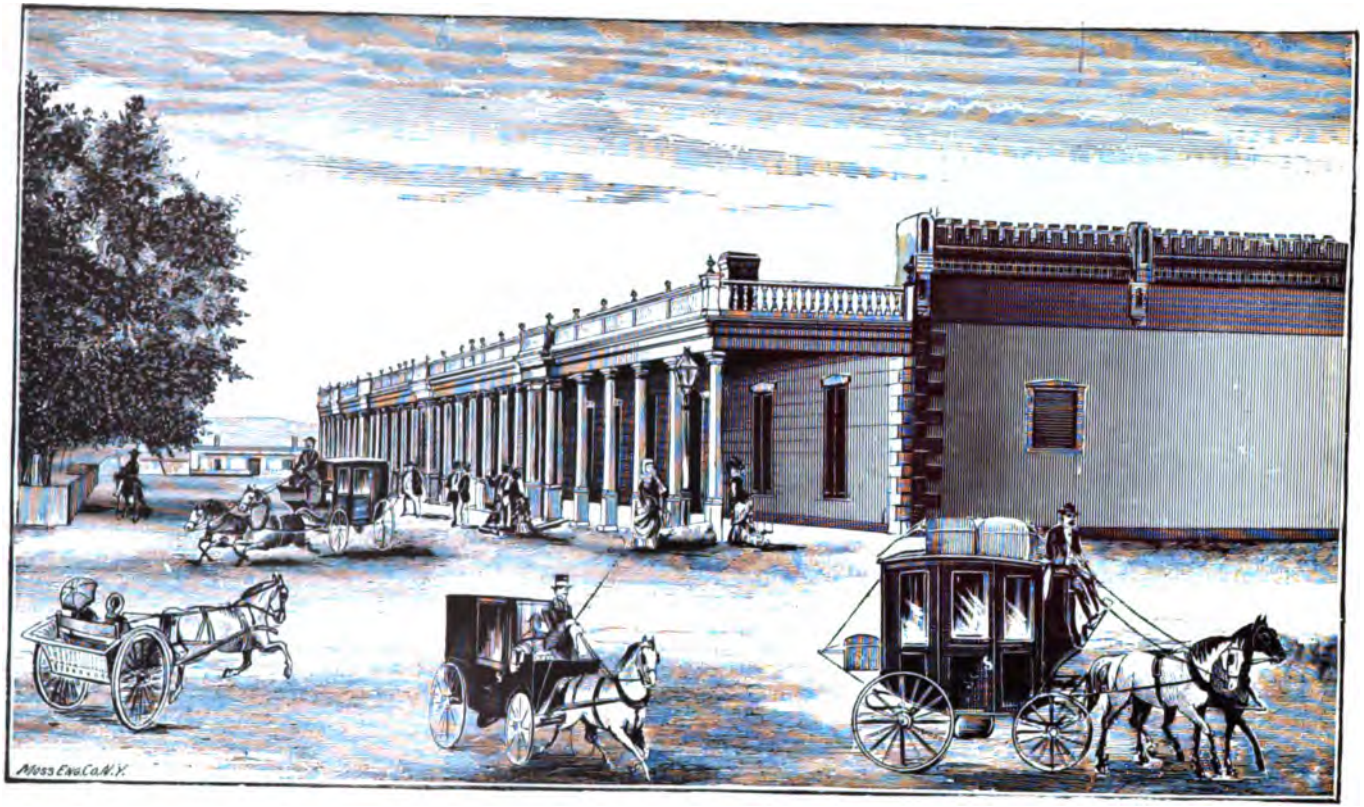
SOCIAL CONDITIONS.

The cities and towns of our Territory are filled with cultured, companionable people, ever ready to entertain and look out for the welfare of the stranger within its gates. The hotels are equal to any of the Eastern summer resorts, and life is as attractive here as anywhere else in the world. In most of the towns throughout New Mexico, a picturesque plaza forms the center of the town. In this plaza concerts are given regularly by the local bands of the town, which are enjoyed alike by the resident and the stranger.

MORAL CONDITIONS.

The material prosperity of the Territory of New Mexico is not more marked than is its moral advancement. The various fraternal societies are well represented, and there are a number of trade and labor unions.

The various church organizations are in charge of refined and cultured men and are well represented. The following-named churches



GOVERNOR'S OLD PALACE, SANTA FE.

are all well attended throughout the Territory in every county and city: Catholic, Episcopal, Methodist Episcopal, Methodist Episcopal South, Presbyterian, Congregational, Christian, Baptist, Mormon, African Methodist, African Baptist, and others.

The fraternal societies in existence here are as follows: Masonic Knights Templar, Thirty-second Degree Scottish, Odd Fellows, Knights of Pythias, Ancient Order of United Workmen, Woodmen of the World, Elks, Red Men, Mystic Shriners, Junior Order of Mechanics, the different railroad organizations, and others.

We also have a large organization of the Grand Army of the Republic, with posts at different localities in the Territory. Their annual reunions are always looked forward to with great pleasure by the old soldier residents of our Territory.

THE VARIOUS CHURCHES.

Next to the schools, the American immigrant inquires concerning the church facilities. These, like the schools, are better in the towns than they are in the country; but this is also the case very largely in the States, and is necessarily so in all new sections. All the leading denominations are represented in the Territory, the towns being graced with handsome edifices, where attractive sermons are delivered by able and educated ministers, and where well-trained choirs add the pleasing enticement of music to the gospel's tender entreaties.

The Catholic Church, of course, first occupied the field in the Territory. The first Protestant church to enter the Territory was the Baptist. Rev. Samuel Gorman, of that church, in 1850 was the first Protestant missionary to the Pueblos, his labors being centered in Laguna. The Methodists were but one year behind their Baptist brethren. Following close upon the Methodists, the Presbyterians came to the Territory in 1851. The first Episcopal services in New Mexico were held at Santa Fe, in 1863. The first Congregational church in New Mexico was organized in 1881 at Albuquerque, and several other churches have since followed.

There are many of the Jewish faith in New Mexico, but, as far as the writer has been able to ascertain, they have organized congregations and regular worship only at Albuquerque and Las Vegas.

The colored people of the Territory generally belong to the African Methodist Church, of which denomination there are organized churches at Albuquerque, Las Vegas, and one or two more of the larger towns.

The Mormons have a few settlements in New Mexico, but these they have exclusively to themselves, and they are pretty generally on the northwestern borders of the Territory. There are Freethinkers, Unitarians, and Universalists scattered through the various towns, but none of these faiths have any organized societies.

"THE ADOBE PALACE."

The old residence of the governors-general under Spanish and Mexican rule, known as the "Palace," which for more than three hundred years has been the headquarters of the governors, captains-general, and chief executives of the Territory, province, or kingdom, is now in an admirable state of preservation, owing to the liberal appropriations made by the Government in the past. I regret to say, however, that unless the General Government continues to look after this historic old building, as it has in the past, it will soon go to ruin and decay.

It is at present occupied in the west end by the post-office; in the center as the residence and office of the Territorial secretary, and in the east end by the governor for his office and the historical society of the Territory. This last institution has stored therein many rare and curious images and other works of prehistoric races found in the Territory, as well as ancient arms, armor, and articles of household use.

In an act passed by the last Congress, donating lands to the public schools and institutions of the Territory, approved June 21, 1898, by inadvertence a clause was inserted, being the last three lines of section 6 of the act, donating this historic old building to the Territory, as follows:

> The building known as the "Palace," in the city of Santa Fe, and all lands and appurtenances connected therewith and set apart and used therewith, are hereby granted to the Territory of New Mexico.

This clause does not meet with the approbation of our citizens, who believe that, so long, at least, as we are a Territory, this palace should remain under the fostering care and protection of the General Government.

The Territory is not financially able to take proper care of and preserve this building as should be done, as it requires all the revenue possible to maintain its own public buildings and institutions which are necessary to the proper conduct of its government. In addition, our people feel that the United States owning and caring for this building puts it in closer touch with all of our citizens, and accordingly I most earnestly recommend that such clause of section 6 of the act above referred to be repealed.

While the new capitol building, now nearing completion, will have offices for the governor and secretary, yet they are so distant from the business part of the city it will be inconvenient for these officers to use them except during the session of the legislature, which meets only once in two years and sits for sixty days, and during the remainder of the two years these officers should be in a more convenient locality, such as is afforded by the old "Palace," and it is only proper that the Government itself should furnish these officials with offices, the same as it does other United States officials.

The post-office is also located in this building, most conveniently for the accommodation of the public, and, of course, without any expense for rent.

The building is now badly in need of repair, and will of course suffer greatly on account of not getting the appropriation asked for last year by the Territorial secretary and custodian.

I trust that my recommendation will be carried out, and that the necessary appropriation will be made by Congress, as asked by the secretary, and attached hereto, in order that the necessary work be commenced at as early a day as possible.

In this connection, showing the historical association connected with this old building, I desire to quote from the report of my predecessor, Hon. L. Bradford Prince, made in 1890. The accuracy of the statements here made can not be doubted, as ex-Governor Prince has made a study of New Mexico and has written a history of the Territory which is recognized as an authority.

Ex-Governor Prince, in his report, says:

> Without disparaging the importance of any of the cherished historical localities of the East, it may be truthfully said that this ancient palace surpasses in historic interest and value any other place or object in the United States. It

antedates the settlement of Jamestown by nine years and that of Plymouth by twenty-two, and has stood during the two hundred and ninety-two years since its erection not as a cold rock or monument, with no claim upon the interest of humanity except the bare fact of its continued existence, but as the living center of everything of historic importance in the Southwest. Through all that long period, whether under Spanish, Pueblo, Mexican, or American control, it has been the seat of power and authority. Whether the ruler was called viceroy, captain-general, political chief, department commander, or governor, and whether he presided over a kingdom, a province, a department, or a Territory, this has been his official residence.

From here Oñate started in 1599 on his adventurous expedition to the eastern plains; here, seven years later, 800 Indians came from far-off Quivira to ask aid in their war with the Axtaos; from here, in 1618, Vincente de Salivar set forth to the Moqui country, only to be turned back by rumors of the giants to be encountered; and from here Peñalosa and his brilliant troop started on the 6th of March, 1662, on their marvelous expedition to the Missouri; in one of its strong rooms the commissary-general of the Inquisition was imprisoned a few years later by the same Peñalosa; within its walls, fortified as for a siege, the bravest of the Spaniards were massed in the revolution of 1680; here, on the 19th of August of that year, was given the order to execute 47 Pueblo prisoners in the plaza which faces the building; here, but a day later, was the sad war council held which determined on the evacuation of the city; here was the scene of triumph of the Pueblo chieftains as they ordered the destruction of the Spanish archives and the church ornaments in one grand conflagration; here De Vargas, on September 14, 1692, after the eleven hours' combat of the preceding day, gave thanks to the Virgin Mary, to whose aid he attributed his triumphant capture of the city; here, more than a century later, on March 3, 1807, Lieutenant Pike was brought before Governor Alencaster as an invader of Spanish soil; here, in 1822, the Mexican standard, with its eagle and cactus, was raised in token that New Mexico was no longer a dependency of Spain; from here, on the 6th of August, 1837, Governor Perez started to subdue the insurrection in the north, only to return two days later and to meet his death on the 9th near Agua Fria; here, on the succeeding day, Jose Gonzales, a Pueblo Indian of Taos, was installed as governor of New Mexico, soon after to be executed by order of Armijo; here, in the principal reception room, on August 12, 1846, Captain Cooke, the American envoy, was received by Governor Armijo and sent back with a message of defiance; and here, five days later, General Kearny formally took possession of the city, and slept, after his long and weary march, on the carpeted earthen floor of the palace.

From every point of view it is the most important historical building in the country, and its ultimate use should be as the home of the wonderfully varied collections of antiquities which New Mexico will furnish.

Coming down to more modern times, it may be added that here General Lew. Wallace wrote Ben Hur, while governor, in 1879 and 1880.

TERRITORY OF NEW MEXICO,
OFFICE OF THE SECRETARY,
Santa Fe, October 3, 1898.

YOUR EXCELLENCY: I had the honor on the 10th day of September, 1897, to submit for your consideration and approval, to be forwarded to the honorable Secretary of the Interior, a statement of the then condition and needs of the "Adobe Palace" in this city.

In section 6 of an act of Congress approved June 21, 1898, the "Adobe Palace" and the grounds in connection therewith were ceded to the Territory of New Mexico. This historical building has often been brought to the attention of Congress in petitions for its preservation, and its transfer came as a surprise to the whole Territory. It is almost the last remaining link between the very earliest days of Spanish occupation, more than three hundred years ago, and the present.

The building is a mecca for all tourists to New Mexico and the Southwest, both native and foreign, and, as the former custodian, I have to report visitors almost every day in the past two years, sometimes numbering as many as a hundred at one time.

The transfer of this building to the Territory, under the provisions of the act, means its early and sure destruction, for under the act any income derived from the building must go to the school fund, and the Territory could not and would not preserve it. Placed as it is upon the public plaza, as in Spanish and Mexican countries is always done, I feel confident there would be a constant struggle by individuals for occupancy of it, and there would be no income derived for the school fund.

Upon the request of very many of the most public-spirited, respectable, and intelligent of our citizens, within and without the city of Santa Fe, I would most earnestly urge the repeal of that portion of section 6 in the said act referring to the "Adobe Palace" in Santa Fe.

And in this connection it is proper to call attention to the estimates submitted in the year 1897 for the purpose of putting the "Adobe Palace" in complete and substantial repair, a copy of which is forwarded herewith. The need is greater to-day than two years ago.

I am, very respectfully, yours,

GEO. H. WALLACE,
Secretary of New Mexico and former Custodian of the Adobe Palace.

Hon. MIGUEL. A. OTERO,
Governor of New Mexico, Santa Fe

OFFICE OF THE SECRETARY AND CUSTODIAN OF THE ADOBE PALACE,
Santa Fe, N. Mex., September 10, 1897.

Sir: In reply to your request for a statement as to the condition and needs of the Adobe Palace, I have the honor to submit the following:

The amount ($2,000) expended by my predecessor during the last fiscal year for new roof, repairs to post-office room, etc., left much to be done to place the building in thorough repair and preserve it from the weather. The wooden sidewalk is nearly worn out and must be replaced. It will be better for the building, and comply with the request of the city, if this should be made of cement with a stone curbing. About 150 feet of the portal is falling from decay, and must be replaced. This was not roofed last year for this reason: The ceilings of the entire building have been of canvas, but now that there is a steel roof, economy and health demand the substitution of plaster in place of the constantly falling cloth, so easily destroyed and calling for repair. The floors are scarcely any two on the same level, and, being of soft pine, are very much worn and in some places patched to the limit of possibility.

A thorough coat of paint, outside and in, and calcimining for the walls are badly needed, in addition to a plaster repair of the outside and inside walls.

The plumbing needs overhauling, and as the supply of water is now entirely from the city system, should be extended to the residence portion of the palace.

The following is submitted as an estimate of the amount necessary by the above conditions, and for the proper protection of the building, and to make it comfortable for occupancy:

Ceilings and floors	$2,000
Cement sidewalk	1,000
Painting and calcimining	500
Portal and roof	1,000
Plumbing	500
Incidental repairs	1,000
Total	6,000

Very obediently, yours,

GEO. H. WALLACE,
Secretary of New Mexico and Custodian of the Adobe Palace.

Hon. MIGUEL A. OTERO,
Governor of New Mexico.

APPROPRIATIONS.

The salary of the governor is fixed by statute (May 1, 1876, R. S. U. S., sec. 1845) at $3,500 per annum, but for many years—indeed, since the act was passed—there has only been an appropriation to pay this salary of $2,600, and it has been determined in the Supreme Court of the United States, in a case taken from the Court of Claims, that the acceptance by the officer of the amount of the appropriation was a bar to his receiving anything more.

The same is true of the secretary of the Territory, his salary, as fixed by statute (same section), being $2,500 per annum, and the appropriation being $1,800.

While these amounts might have been sufficient at the time the act was passed, twenty-two years ago, the duties and responsibilities of both officers have increased to a wonderful extent by reason of the increase in population, the construction of railroads, and general business enterprises. The actual work occupies all the time during business hours, and constantly encroaches far into the night, besides necessitating frequent journeys from one part of the Territory to another on official business.

In addition, there is no provision of law for a private secretary or clerk to the governor, while his official correspondence alone is enormous, and he is obliged to employ a private secretary for only a part of the time, and settle for the same out of other resources, not being able to give constant employment, which should be done in the interest of public business.

The secretary of the Territory is allowed a clerk, with an appropriation of $1,200 per annum to pay the same. I would therefore recommend most strongly that the governor be allowed a clerk by the Government, at a salary of $1,200 per annum, and that an appropriation be made accordingly.

I would also earnestly recommend that the full compensation provided by law to the governor and secretary be included in an appropriation to that amount.

By the Territorial laws the governor is made ex officio a member of nearly all of the boards of regents and directors of the different Territorial institutions, and of necessity meets with them in different portions of the Territory when occasion presents. This of itself involves a considerable outlay of traveling expenses, for which the present appropriation of $500 is totally inadequate, as out of this amount has to be paid fuel, lights, stationery, telegrams, janitor service, office furnishings, etc., and, as the office is constantly running behind, I would recommend an increase for contingent expenses of the governor's office.

The five judges of the Territory of New Mexico, consisting of the chief justice of the supreme court, with four associate justices, are allowed $3,000 per annum only. The work is so heavy that they are actually holding either district or supreme court for the hearing and trial of cases eleven months in each year; and under our Territorial law the courts are open at all times for the transaction of any business not involving an actual trial by jury, so that the chambers work is very heavy. In the Indian Territory there are four judges, at an annual compensation of $5,000; Oklahoma has five judges, with a salary of $3,000 each. The population of New Mexico, while not as large, is nearly equal to that of the two above-named Territories, while its area is double that of the two Territories named.

The compensation of these judges was also fixed on the 1st of May, 1876, when there were no railroads in the country, less than one-third of our present population, with no communication with the outside world except by wagon, and it is altogether too inadequate a compensation for the responsibility and labor involved.

I would therefore earnestly recommend that the compensation of each of the judges of the supreme court be increased to $5,000 per annum.

RAILROADS.

The railroad interests are a most important factor in the development of the resources of the Territory, and but few of the towns and villages are now without railroad and telegraphic communication.

There are at present 1,693 miles of railroad actually constructed within the Territory, owned and operated by eleven different corporations, as follows:

Atchison, Topeka and Santa Fe Railway Company.
Denver and Rio Grande Railroad Company.
Pecos Valley and Northeastern Railroad Company.
Santa Fe Pacific Railway Company.
Southern Pacific Railway Company.
El Paso and Northeastern Railroad Company.
Colorado and Southern Railroad Company.
New Mexico and Arizona Railroad Company.
Arizona and New Mexico Railroad Company.
Alamogordo and Sacramento Mountain Railroad Company.
Tierra Amarilla Southern Railroad Company.

Some of these companies operate wholly within the Territory, but a majority of them have only a portion of their mileage within the Territory.

The Atchison, Topeka and Santa Fe, one of the pioneer railway systems of the West, has by far the largest mileage, as it enters the north line of the Territory near the city of of Raton, passes through the entire Territory near the center, traversing the fertile valley of the Rio Grande, and passing out near the city of El Paso, Tex. Upon the main line of this road and its numerous branch lines are the three largest cities of the Territory—Las Vegas, Santa Fe, and Albuquerque—and also the cities of Raton, Springer, Los Lunas, Socorro, San Marcial, Las Cruces, Deming, and Silver City. This company alone has 692 miles of constructed track within the Territory,

The Denver and Rio Grande Railroad enters the Territory south of the town of Antonito, Colo., and passes through the Territory in a southerly direction to the city of Santa Fe, a distance of 114 miles. It also enters the Territory again west of the town of Antonito, and has 52 miles of track in the Territory upon the line from Antonito to Durango. This company, therefore, has 166 miles of its road within the Territory, and the city of Santa Fe and the towns of Espanola, Embudo, Tres Piedras, Chama, and Lumberton are upon this road.

The Pecos Valley and Northeastern Railroad Company have 192 miles of constructed road within the Territory. It traverses the fertile Pecos River Valley, passing the cities of Roswell and Carlsbad, and many other cities and towns on its line recently constructed to Amarilla, Tex.

The El Paso and Northeastern is a new road upon which work is still in progress. This company has a mileage of 152 miles within the Territory. Leaving the city of El Paso, Tex., it passes through Fort Bliss, Jarilla, Alamogordo, La Luz, Tularosa, and Three Rivers to its

present terminus in the Salado coal fields at the town of Gray. This line of road passes through some of the best mining, timber, stock raising, and farming lands of the Territory.

The Santa Fe Pacific has a mileage of 157 miles within the Territory, from the city of Albuquerque to the city of Gallup, where the road enters the Territory of Arizona. The towns of Laguna, Grants, Bluewater, Wingate, Manuelito, and Gallup are situated along this portion of the road.

The Southern Pacific Railroad Company has about 166 miles of its tracks within this Territory. Entering the Territory from the east about 4 miles northwest of the city of El Paso, Tex., passing through a broad plain devoted mainly to the stock industry, it enters the Territory of Arizona near San Simon. The towns of Deming, Lordsburg, and Shakespeare are situated upon this road.

The Colorado and Southern Railroad Company has 76 miles of its tracks within the Territory, and crosses the extreme northeastern corner. The road passes through the town of Clayton, which is the county seat of Union County, and enters the State of Texas at the town of Texline. Stock raising is the most important industry along this portion of the road.

Passing again to the southwestern portion of the Territory, there is the New Mexico and Arizona Railroad Company, whose road runs from Deming, N. Mex., to Benson, Ariz., a distance of 176 miles. This company uses the track of the Southern Pacific from Deming to Lordsburg, so that but 25 miles of its own track is within this Territory.

The Arizona and New Mexico Railroad Company has constructed its road from Lordsburg to Clifton, Ariz., and 30 miles of this road is in New Mexico. The principal industry of this road is the transportation of ores, but it also does a general railroad business.

The Alamogordo and Sacramento Mountain Railroad Company has constructed 20 miles of their line, running from the town of Alamogordo to Cloudcroft, upon the summit of the Sacramento Mountains, during the past year. This road is used mainly for the transportation of timber to the mills of Alamogordo. This road will be extended to Penasco, a distance of 15 miles, during the present year.

The Tierra Amarilla Southern Railroad Company is a private road, owned by the Burns & Biggs Lumber Company. It runs from the town of Chama, Rio Arriba County, to the town of Brazos, in the same county, a distance of 17 miles.

NEW RAILROADS.

There have been 290 miles of new railroad constructed within the Territory during the past year by the following companies:

	Miles.
El Paso and Northeastern	152
Pecos Valley and Northeastern	100
Alamogordo and Sacramento Mountain	20
Atchison, Topeka and Santa Fe	18

but this new mileage is included in the above total.

PROJECTED RAILROADS.

It seems altogether probable that a new railroad will be constructed at a very early day from the city of Las Vegas through the Mora Valley to the town of Taos, a distance of 100 miles. A company has been

incorporated for the purpose of constructing this road. The line has been surveyed, and some preliminary work has been done upon the road. If constructed, it will open up a most fertile portion of the Territory, as well as large mining and timber industries.

A new railroad is also projected from Albany, Tex., through the city of Las Vegas and on to the Northwest, but of its construction little can be said at this time, as the project has not taken definite shape, so far as I am advised.

A railroad company has also been organized for the purpose of constructing a new railroad from the city of Durango, in the State of Colorado, through San Juan County, N. Mex., to the city of Albuquerque or Gallup, but while I am of the opinion that it is only a question of time when such road will be constructed, I can only refer to it as a projected road because of the meager information now at hand.

RECAPITULATION.

Railroads now constructed.

	Miles.
Atchison, Topeka and Santa Fe Railway Company	692
Pecos Valley and Northeastern Railroad Company	192
Denver and Rio Grande Railroad Company	166
Southern Pacific Railroad Company	166
El Paso and Northeastern Railroad Company	152
Santa Fe Pacific Railroad Company	157
New Mexico and Arizona Railroad Company	25
Arizona and New Mexico Railroad Company	30
Alamogordo and Sacramento Mountain Railroad Company	20
Colorado and Southern Railroad Company	76
Tierra Amarilla Southern Railroad Company	17

New mileage constructed within a year, 290.
Railroad companies operating in the Territory, 11.

Elevations on line of Atchison, Topeka and Santa Fe Railway in New Mexico.

Station name.	Elevation.	Station name.	Elevation.
	Feet.		*Feet.*
North Portal Tunnel	7,548.00	Levy	6,223.00
Lynn	7,525.00	Bond	6,203.00
Raton	6,597.00	Shoemaker	6,229.00
Otero	6,357.00	Kroenig	6,549.00
Dorsey	6,042.00	Azul	6,650.00
Maxwell City	5,864.00	Las Vegas	6,368.50
Toril	5,884.00	Blackwell	6,257.00
Rayado	5,947.00	Chapelle	6,043.00
Nolan	6,042.00	Ribera	5,998.50
Wagonmound	6,153.00	Fulton	6,502.00
Tipton	6,340.00	Rowe	6,781.00
Watrous	6,370.00	Fox	7,126.00
Onava	6,705.00	Canoncito	6,833.00
Arriba	6,451.00	Twichell	6,311.00
Romero	6,202.50	Ortiz	5,796.00
Sulsbacher	5,955.00	Waldo	5,591.00
Blanchard	6,357.00	Thornton	5,224.00
Sands	6,266.00	Elota	5,098.80
Gise	6,763.00	Bernalillo	5,009.00
Pecos	7,028.64	Albuquerque	4,910.00
Glorieta	7,415.00	Barr	4,869.00
Lamy	6,447.00	Los Lunas	4,809.00
Galisteo	6,000.00	Sabinal	4,720.00
Los Cerrillos	5,647.65	Alimillo	4,613.00
Rosario	5,383.00	Socorro	5,550.00
South Portal Tunnel	7,584.00	Arny	4,486.00
Hillside	7,028.00	Pope	4,530.00
Dillon	6,435.00	Crocker	4,688.50
Hebron	6,136.00	Cudder	4,664.00
Schomburg	5,951.00	Upham	4,516.38
Dover	5,796.00	Rincon	4,021.00
Springer	5,745.00	Tonuco	4,220.00
Colmor	5,901.00	Leasburg	3,918.00

Elevations on line of Atchison, Topeka and Santa Fe Railway in New Mexico—Continued.

Station name.	Elevation.	Station name.	Elevation.
	Feet.		*Feet.*
Lascruces	3,850.00	San Marcial	4,418.00
Mesquite	3,795.00	Lava	4,685.00
Berino	3,762.00	Engle	4,728.00
Deming	4,477.70	Aleman	4,622.00
Magdalena	6,609.00	Grama	4,306.00
Santa Rita	6,460.00	Detroit	4,016.40
Lake Valley	5,115.00	Selden	3,927.00
Blossburg	6,760.00	Dona Ana	3,879.00
Algodones	5,065.00	Mesilla Park	3,837.00
Alamedo	4,957.00	Earlham	3,781.00
Abajo	4,898.00	Anthony	3,753.12
Isleta	4,856.00	Silver City	6,000.00
Belen	4,762.00	Whitewater	5,295.00
Lajoya	4,666.00	Nutt	4,759.00
Lemitar	4,584.00	Santa Fe	6,919.00
San Antonio	4,500.00	Las Vegas Hotsprings	6,611.00

REPORT OF COMMISSION OF IRRIGATION AND WATER RIGHTS.

I beg to submit herewith report made to me by the above-named commission during the last legislative assembly, held in Santa Fe, N. Mex., on January 16, 1899, which is as follows:

The undersigned, constituting the commission of irrigation and water rights in the Territory of New Mexico, appointed pursuant to the act of the legislative assembly approved March 18, 1897, respectfully submit the following report:

The law under which the commission was appointed is the following:

'AN ACT creating a commission of irrigation and water rights. C. B. 127; approved March 18, 1897.

"*Be it enacted by the thirty-second legislative assembly of the Territory of New Mexico:*

"SEC. 1. A commission is hereby created to consist of the president of the council and the speaker of the house of representatives of the thirty-second legislative assembly of the Territory of New Mexico, three resident citizens of this Territory to be selected by said president and speaker jointly, which commission is hereby directed to inquire into the conditions existing in different portions of the Territory with reference to irrigation and water rights, to examine the laws upon this subject in force in this Territory and in other States and countries, and to recommend to the next legislative assembly such legislation as in the opinion of said commission shall meet all requirements on this subject.

"The members of the said commission shall meet within sixty days after the adjournment of the thirty-second legislative assembly at such place as they may agree upon and organize by the election of a president and secretary from among their number.

"It shall be the duty of such commission to embody in a report to the governor of the Territory all possible information concerning the subject of irrigation and water supply, the amount of land in the Territory cultivated by the means of irrigation, the extent of the present and proposed systems of storage reservoirs, and such other facts as they may deem proper and useful, which report shall be published at least twenty days before the beginning of the next session of the legislature.

"SEC. 2. The members of the commission hereby created shall serve without pay or compensation, but their expenses while actually engaged in the performance of the duties prescribed by this act shall be paid by the Territorial treasurer out of any available funds in his hands, and the Territorial auditor is hereby authorized and directed to draw his warrant upon the treasurer for such expenses upon certificates signed by the president and secretary of such commission.

"SEC. 3. This act shall take effect and be in force from and after its passage."

The members of the commission met at Santa Fe within the time prescribed by said act, and organized by electing Anthony Joseph president and Joseph E. Saint secretary. Meetings were subsequently held at Albuquerque on the 9th of October, 1898, and the 26th of October, 1898.

At the first of these meetings plans were adopted for carrying on the work devolving upon the commission, receiving reports of subcommittees and of the different members touching special matters referred to them, and at the latter meetings the material for the final report was fully considered and the text of the report formulated.

After dividing up the work of gathering information among the several members of the commission in the first instance, it was found that the examination of existing conditions in the Territory and the accumulation of the facts relating thereto would require an amount of work and a degree of technical knowledge which none of the members could furnish. After a careful consideration, and after consultation with the governor and obtaining his approval, we employed Mr. P. E. Harroun, an accomplished civil and hydraulic engineer, for a limited time, to make such investigation and report as was deemed necessary to enable us to comply with the law.

The investigations made by the several members of the commission, and the facts set forth in Mr. Harroun's report, have convinced us that the greatest need of New Mexico upon the subject of irrigation and water rights at the present time is not new legislation, but accurate information. Acting, as we have done, without compensation, it was not practicable for the members of the commission to devote any considerable time to the gathering of facts of the kind desired. These are only to be obtained by actual observation in the field, and to be of real service this can only be done by a trained observer, familiar with the approved scientific methods of studying such a subject. The data bearing upon the flow of water in streams, variable as are those of New Mexico with the time of the year, the drainage area of localities favorable for the collection of surface and torrential waters for storage, and the quantities of land susceptible of reclamation by storage or additional irrigation by improved methods, can for the most part only be collected for practical use by systematic observation and record of facts, often extending through months and years. The facts presented in this report are, as to a large part of the Territory, necessarily general, and not based upon the systematic study above alluded to. In the northeastern and southeastern parts of the Territory, where the Maxwell and Pecos companies, respectively, have constructed extensive irrigation systems on a large scale and according to modern scientific methods, it is possible to secure reliable and instructive data. In the greater part of the Territory, however, the lack of detailed observation and systematic record prevents anything more than a fair general statement of conditions and results at the present time. No work of this kind has ever been done by the Territory. The small amount of it that has been done by the Government has been confined to the Rio Grande Valley.

While, therefore, the members of the commission feel that they have accomplished about as much as was reasonably practicable under the circumstances, they regard their report as suggestive of what might be done by a better organized effort, rather than as of any great permanent value in itself.

There are certain matters now requiring attention, of vast importance as regards the future of the Territory, which seem to us to imperatively call for further and more complete investigation in the line of the work intrusted to us:

First. The selection of lands donated by Congress to New Mexico in aid of irrigation and the reclamation of arid lands, and for the maintenance of educational and other institutions.

The law making this donation, enacted June 21, 1898, is as follows:

"AN ACT to make certain grants of land to the Territory of New Mexico and for other purposes.

"*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That sections numbered sixteen and twenty-six in every township of the Territory of New Mexico, and where such sections, or any parts thereof, are mineral or have been sold or otherwise disposed of by or under the authority of any act of Congress, other nonmineral lands equivalent thereto, in legal subdivisions of not less than one quarter section, and as contiguous as may be to the section in lieu of which the same is taken, are hereby granted to said Territory for the support of common schools, such indemnity lands to be selected within said Territory in such manner as is hereinafter provided: *Provided*, That the sixteenth and thirty-sixth sections embraced in permanent reservations for national purposes shall not at any time be subject to the grants of this act, nor shall any land embraced in Indian, military, or other reservations of any character be subject to the grants of this act; but such reservations shall be subject to the indemity provisions of this act.

"SEC. 2. That fifty sections of the unappropriated nonmineral lands within said Territory, to be selected and located in legal subdivisions as hereinafter pro-

vided in this act, shall be, and are hereby, granted to said Territory for the purpose of erecting public buildings at the capital of the State of New Mexico when said Territory shall become a State, and be admitted into the Union, when said capital shall be permanently located by the people of New Mexico for legislative, executive, and judicial purposes.

"SEC. 3. That lands to the extent of two townships in quantity, authorized by the sixth section of the act of July twenty-second, eighteen hundred and fifty-four, to be reserved for the establishment of a university in New Mexico, are hereby granted to the Territory of New Mexico for university purposes, to be held and used in accordance with the provisions in this section; and any portions of said lands that may not have been heretofore selected by said Territory may be selected now by said Territory. That in addition to the above, sixty-five thousand acres of nonmineral, unappropriated, and unoccupied public land, to be selected and located as hereinafter provided, together with all saline lands in said Territory, are hereby granted to the said Territory for the use of said university, and one hundred thousand acres to be in like manner selected, for the use of an agricultural college. That the proceeds of the sale of said lands, or any portion thereof, shall constitute permanent funds, to be safely invested, and the income thereof to be used exclusively for the purposes of such university and agricultural college, respectively.

"SEC. 4. That five per centum of the proceeds of the sales of public lands lying within said Territory which shall be sold by the United States subsequent to the passage of this act, after deducting all expenses incident to the same, shall be paid to the said Territory, to be used as a permanent fund, the interest of which only shall be expended for the support of the common schools within said Territory.

"SEC. 5. That the schools, colleges, and university provided for in this act shall forever remain under the exclusive control of said Territory, and no part of the proceeds arising from the sale or disposal of any lands herein granted for educational purposes, or of the income thereof, shall be used for the support of any sectarian or denominational school, college, or university.

"SEC. 6. That in lieu of the grant of land for purposes of internal improvement, made to new States by the eighth section of the act of September fourth, eighteen hundred and forty-one, which section is hereby repealed as to New Mexico, and in lieu of any claim or demand of the State of New Mexico under the act of September twenty-eighth, eighteen hundred and fifty, and section two thousand four hundred and twenty-nine of the Revised Statutes, making a grant of swamp and overflowed lands, which grant it is hereby declared is not extended to said State of New Mexico, the following grants of nonmineral and unappropriated land are hereby made to said Territory for the purposes indicated, namely:

"For the establishment of permanent water reservoirs for irrigating purposes, five hundred thousand acres; for the improvement of the Rio Grande in New Mexico, and the increasing of the surface flow of the water in the bed of said river, one hundred thousand acres; for the establishment and maintenance of an asylum for the insane, fifty thousand acres; for the establishment and maintenance of a school of mines, fifty thousand acres; for the establishment and maintenance of an asylum for the deaf and dumb, fifty thousand acres; for the establishment and maintenance of a reform school, fifty thousand acres; for the establishment and maintenance of normal schools, one hundred thousand acres; for the establishment and maintenance of an institution for the blind, fifty thousand acres; for a miner's hospital for disabled miners, fifty thousand acres; for the establishment and maintenance of a military institute, fifty thousand acres; for the enlargement and maintenance of the Territorial penitentiary, fifty thousand acres. The building known as the Palace, in the city of Santa Fe, and all lands and appurtenances connected therewith and set apart and used therewith, are hereby granted to the Territory of New Mexico.

"SEC. 7. That this act is intended only as a partial grant of the lands to which said Territory may be entitled upon its admission into the Union as a State, reserving the question as to the total amount of lands to be granted to said Territory until the admission of said Territory as a State shall be determined on by Congress.

"SEC. 8. That all grants of land made in quantity or as indemnity by this act shall be selected by the governor of the Territory of New Mexico, the surveyor-general of the Territory of New Mexico, and the solicitor-general of said Territory, acting as a commission, under the direction of the Secretary of the Interior from the unappropriated public lands of the United States within the limits of the said Territory of New Mexico.

"SEC. 9. That said commission shall proceed, upon the passage of this act, to

select said lands, for each purpose as hereinbefore designated, in legal subdivisions, of not less than one quarter section, and shall report to the Secretary of the Interior such selections, designating in such report the purpose for which such bodies of land as selected are to be respectively used as provided above in this act.

"SEC. 10. That the lands reserved for university purposes, including all saline lands, and sections sixteen and thirty-six reserved for public schools, may be leased under such laws and regulations as may be hereafter prescribed by the legislative assembly of said Territory; but until the meeting of the next legislature of said Territory, the governor, secretary of the Territory, and the solicitor-general shall constitute a board for the leasing of said lands; and all necessary expenses and costs incurred in the leasing, management, and protection of said lands and leases may be paid out of the proceeds derived from such leases. And it shall be unlawful to cut, remove, or appropriate in any way any timber growing upon the lands leased under the provisions of this act, and not more than one section of land shall be leased to any one person, corporation, or association of persons, and no lease shall be made for a longer period than five years, and all leases shall terminate on the admission of said Territory as a State; and all money received on account of such leases in excess of actual expenses necessarily incurred in connection with the execution thereof, shall be placed to the credit of separate funds for the use of said institutions, and shall be paid out only as directed by the legislative assembly of said Territory, and for the purpose indicated herein. The remainder of the lands granted by this act, except those lands which may be leased only as above provided, may be sold under such laws and regulations as may be hereafter prescribed by the legislative assembly of said Territory; and all such necessary costs and expenses as may be incurred in the management, protection, and sale of said lands may be paid out of the proceeds derived from such sales; and not more than one quarter section of land shall be sold to any one person, corporation, or association of persons, and no sale of said lands or any portion thereof shall be made for less than one dollar and twenty-five cents per acre; and all money received on account of such sales, after deducting the actual expenses necessarily incurred in connection with the execution thereof, shall be placed to the credit of separate funds created for the respective purposes named in this act, and shall be used only as the legislative assembly of said Territory may direct, and only for the use of the institutions or purposes for which the respective grants of lands are made: *Provided*, That such legislative assembly may provide for leasing all or any part of the lands granted in this act on the same terms and under the same limitations prescribed above as to the lands that may be leased only, but all leases made under the provisions of this act shall be subject to the approval of the Secretary of the Interior, and all investments made or securities purchased with the proceeds of sales or leases of lands provided for by this act shall be subject to like approval by the Secretary of the Interior.

"SEC. 11. That there is hereby appropriated from the unexpended funds in the Treasury of the United States, ten thousand dollars, or so much thereof as may be necessary, to be expended under the direction of the Secretary of the Interior, for the purpose of paying the expenses of the selection and segregation of said respective bodies of land, including such compensation as the Secretary of the Interior may deem proper.

"SEC. 12. That all acts and parts of acts in conflict with the provisions of this act, whether passed by the legislative assembly of said Territory or by Congress, are hereby repealed."

It will be apparent to everyone acquainted with the conditions existing in New Mexico, that the location and selection of these lands is going to be a matter of enormous importance, and that it will depend solely upon an intelligent selection whether they shall ultimately become saleable or productive of income by way of rental so as to accomplish the purposes for which the law is designed. There are large quantities of public land in the Territory which never will become saleable at the price fixed by the law, and which could not be leased for any appreciable interest on that price, especially with the restriction as to quantity of land to be leased or sold to any one person. On the other hand, there are many localities where lands will ultimately attain the maximum value of farming lands by reason of their proximity to eligible sites for future water storage and irrigation systems. To be of permanent value, a large part of the donated land ought to be selected with reference to their future reclamation in this way. For such selections there is at the present time no reliable guide. The information in possession of the United States surveyor-general would not suffice for this purpose. Nothing short of an examination by competent hydraulic engineers would furnish the facts which are absolutely essential.

Second. The injury to the people of New Mexico by the increased and constantly increasing appropriation of water from the head tributaries of the Rio Grande in Colorado.

Sooner or later this is bound to become an interstate question, and in order that the interests of New Mexico shall be properly guarded it will be essential that her representatives be armed with absolute and accurate information touching the flow of water in the Rio Grande and its tributaries, covering not only present conditions, but an accumulation of statistics as to the past. Colorado, with its well-organized and liberally supported State engineering department, has a great advantage over us in this respect. Nothing short of a systematic study of these matters, continued through several years, will be adequate to enable us to meet this question when it comes to an issue.

Third. Possible future legislation.

The interests of irrigation are not uniform throughout the Territory on account of the wide differences in latitude, elevation, and character of productions. This is why, as we show further on, any attempt at legislation beyond the general principles already well established is not advisable at the present time. It is impossible, with the information now in hand, to determine beforehand whether any given scheme of legislation desired by and applicable to one part of the Territory may not be the cause of great injury and injustice to another. To enable future legislators to exercise their proper and only legitimate function, viz, that of enacting laws for the benefit of the whole people, the information which might be accumulated by further systematic investigation of these water questions will be absolutely necessary.

One of the duties imposed upon the commission by the act creating the same was the examination into the laws with reference to irrigation and water rights in force in New Mexico, and in other states and countries, and to recommend such legislation as, in the opinion of the commission, will meet all requirements of this subject.

Serious attention has been given to this branch of their duties by the members of the commission, who have brought to their aid the experience and advice of many of the prominent citizens of the Territory and elsewhere, deeply interested in the study and possibility of irrigation. One of the most serious impressions resulting from a study of this branch of the commission's labors is that great embarrassments or losses will almost inevitably occur in making any change that trespasses upon the general system of laws now in force; a very large part of our people, thoroughly understanding the rights which they now have in and to waters beneficially used by them, are strongly distrustful of any proposed change thereof, the demonstration of the result of which they have not seen in practical working. There is a widespread and largely justifiable impression prevailing that the result of changing the present irrigation laws of the Territory in any essential respect would be to disturb vested rights, and to unsettle public confidence in legal rights which have long been owned and beneficially used in the great portion of the waters of our streams. For this reason it was determined by the commission, after thoroughly canvassing the subject at its first meeting, that any and all recommendations from the commission along this line should be of the most conservative character, and that, before any change in the laws was recommended, there should be a close study of the laws and methods of enforcing them as now existing, and unless it was apparent that changes could be recommended which would be of considerable advantage to the public at large, it would be better to recommend that no changes whatever be made. With this spirit the commission, through its committees, entered into the task of the analysis of the present laws of the Territory. These were found to consist of certain Territorial statutes, of several acts of Congress, and of principles announced by the supreme court of the Territory independent of statute.

The first statutory law we have on the subject is the provision of the Kearny Code of 1846, to the effect that all laws in force at the time of the promulgation thereof, concerning water courses, should continue in force. Kearny Code, September 22, 1846, Tit. Water Courses. Sec. 1. (Compiled Laws, 1897, page 89.)

This reference was, undoubtedly, to the Spanish-Mexican laws then in force with reference to the control of water; and, while the commission has not seen fit to go into a special study of the laws thus referred to, it is believed that such reference thereto was intended to apply to the system of community ditch laws, which at that time regulated the rights of the owners thereunder in this Territory, in common with the great body of Mexican possessions in the arid section, and that, at such time, almost all rights claimed by the citizens of New Mexico in the waters of any of its streams were by virtue of such community laws, and that the individual rights of private owners of ditches had not at that time assumed such value as to attract the necessity of legislation to protect the same.

The assumption that the language referred to in the Kearny Code was directed particularly to rights owned under the community system, received additional strength from the fact that the legislative assembly of 1851 and 1852, following close upon the promulgation of the Kearny Code, adopted a set of laws with reference to the community ditch system, which laws were largely the crystallization into statutes of the principles theretofore governing such questions, and the customs arising thereunder. Act of July 20, 1851, page 189. Act of January 7, 1852, page 276. (Compiled Laws, 1865, chap. 1, secs, 1–8. Id. secs., 9–26.)

It is to the Spanish-Mexican laws, therefore, and to legislative enactments beginning in 1851, continuing more or less to the present time, that we owe the present acequia laws of the Territory. The continuance of this system, admirably adapted to the necessities of the people living in the most thickly inhabited parts of the Territory, has been productive of good results where the spirit of the law has been enforced.

Amendments to the laws of 1851 and 1852 were enacted in 1861, regulating the working on public acequias. Act of January 29, 1861. (Compiled Laws, 1865, secs. 27–32.) Also, in 1863, regulating the control of ditches by overseers. Act of January 28, 1863. (Compiled Laws, 1865, secs. 33–39.) Also, in 1866, regulating the repair and relocation of ditches when injured or destroyed by floods. Act of January 18, 1866, pages 90–96. (Compiled Laws, 1897, chap. 1, secs. 25–30.)

In 1874 the legislature extended the right to all persons to construct private acequias and take water therefor from any available source, with a provision for compensation of the owners of the land through which the necessary ditches were constructed; and simple and inexpensive methods were prescribed by which such terms should be assessed and such rights recognized. Act of January 9, 1874, page 28. (Compiled Laws, 1897, chap. 1, secs. 23, 24.)

On February 24, 1887, an act was passed, applicable only to corporations, providing for the organization of such for the purpose of constructing and maintaining reservoirs, canals or ditches, and pipe lines, in order to supply water for irrigation, mining, manufacturing, domestic and other public uses, including cities and towns, and for the purpose of colonization and improvement of lands in connection therewith. This act gave full authority to corporations formed thereunder to acquire water and water rights, either by purchase or condemnation, and to construct ditches, canals, and reservoirs to be used in connection therewith. Laws of 1887, chap. 12, page 29. (Compiled Laws, 1897, chap. 1, secs. 468–493.)

On February 20, 1889, an act was also passed providing that incorporated towns and villages exceeding in population 3,000 persons should have certain priority for the use of water in streams upon or near which they are situated. Laws of 1889, chap. 70, page 150.

On February 26, 1891, another act was passed providing a method by which a record of the subsequent construction or enlargement of any ditch, canal, or feeder for a reservoir taking water from a natural stream should be made, and by which legal appropriation of water should be made, and defining in some particulars the essentials of such legal appropriation. Laws of 1891, chap. 71, page 130. (Compiled Laws of 1897, secs. 493, 494.)

These acts are the only ones announcing any principles adopted by the Territory for the determination of rights respecting water, and, together with two or three minor acts authorizing various counties to assist in irrigation enterprises, and the act of February 13, 1893, exempting all irrigation ditches, canals, and reservoirs from taxes for a period of six years after the commencement thereof, they form the body of Territorial enactments on the subject of water rights.

It will thus be seen that, while our statutory laws on this subject are fragmentary, there is no contradiction or unprogressive feature incorporated in any of the same. On the other hand, they have been found to be simple, in the main logical, and in view of the conditions, both of land and people, have been proved to be beneficial in their workings to the great body of the people. An analysis of these laws shows that they provide for and protect the Spanish-Mexican theory, under which, as stated above, good results have been obtained, and that they also protect and encourage individual enterprises; and that the principles of such laws, as reenforced by the interpretation of the courts, protect each system from any trespass whatever upon the other.

As the ideal of beneficial legislation is the least possible regulation necessary with reference to a given subject, it would appear that our legislators in the past have most promoted the irrigation interests and the development of the Territory by their remarkable conservatism in legislating upon this subject. Few laws have been deemed necessary other than the community system of laws above mentioned, and these have, as above stated, been enacted. The principles of these

laws are easily construed by the courts, and very little difficulty is found in following and putting them into effect. There is no subject with reference to which the laws of the Territory (both the community and private water appropriations) are better understood by the people, or with reference to which principles are more definitely established. We are very largely indebted for this, not only to the above legislation and the decisions of our own courts, but to the decisions of all the courts in the arid States and Territories, in all of which the right to appropriation of surplus waters of all streams is recognized and upheld, qualified only by the doctrine that priority in time gives priority of right; that rights claimed must be perfected with due energy; that the appropriation must be made for beneficial purposes, and is limited to the amount needed for such purposes.

While the legislation of the various States and Territories varies considerably, yet it is believed that all of them recognize this doctrine as above defined. In several of the States and Territories it was early contended that the acts of the citizens thus taking possession of and diverting the water from the streams thereof were contrary to the principles of the common law, which recognizes the rights of riparian owners along such streams; and because of this belief and the confusion into which some of the courts fell in interpreting the rights thus claimed, as well as because of the fact that the rights claimed by different appropriators were found, in many instances, to trespass upon each other, a great amount of litigation, in which the doctrine of the right of appropriation has been involved, has arisen all over the West. Through this litigation it is believed that all questions capable of giving rise to embarrassing disputes concerning the uses of water have practically been settled and adjusted, and the public made familiar therewith. There is a great unanimity of decisions in establishing such principles, and where there is any serious variance it has been caused by local statutes. Indeed, so common was the acquiescence of the public in the rights and principles which governed the appropriation of water, that early in the history of the arid West the Congress of the United States recognized such rights by the law now embraced in sections 2339 and 2340 of the Revised Statutes thereof, which read as follows:

"SEC. 2339. Whenever, by priority of possession, rights to the use of water for mining, agricultural, manufacturing, or other purposes have vested and accrued, and the same are recognized and acknowledged by the local customs, laws, and the decisions of courts, the possessors and owners of such vested rights shall be maintained and protected in the same; and the rights of way for the construction of ditches and canals for the purposes herein specified, is acknowledged and confirmed.

"SEC. 2340. All patents granted or preemption or homesteads allowed shall be subject to any vested and accrued water rights or rights to ditches and reservoirs used in connection with such water rights as may have been acquired under or recognized by the preceding section."

These enactments of Congress have been repeatedly construed by the Supreme Court of the United States, and the opinions contained in such decisions and the announcement thereof, have been a material assistance to all of the States and Territories affected thereby, and have greatly promoted the unanimity of judicial decisions referred to above.

It is therefore apparent, that though, as above stated, legislative enactments of this Territory with reference to this subject are fragmentary, yet, in view of the settled customs prevailing all over the arid West and of the enactments of Congress above referred to, additional legislation has not been and is not now essential in this Territory, to fully guarantee to the people the full and beneficial enjoyments of rights which they have always claimed and now possess. Neither is it believed that any of the statutory enactments have incorporated in the body thereof any vicious principles which might operate to impair the interest of irrigation in the Territory. The result of the laws providing for such systems so enforced in New Mexico with reference to the creation of litigation arising therefrom is the best evidence of the wisdom of that system; and while there have been from time to time some complaints of irregular diversion of water at the expense of proprietors below yet the least number of cases have ever gone beyond the trial court, and comparatively few have been commenced even; such as have arisen have been settled in the main speedily and without hardship to those having the better right to such waters.

One result of our system of laws on this subject is, that when such a case arises, our courts, not being hampered with conflicting and untried provisions, as some other courts of our Western States and Territories, have the great body of principles, as decided by other courts of last resort, to draw from in the adjustment of their decisions along the line of equity and good sense, and the widest possible latitude in putting their decisions into effect.

A notable case has recently been tried in one of the southern counties of the

Territory, involving the most complicated issues and a vast number of litigants, having some 30 or 40 parties thereto, and involving as many claims of priority for different appropriations; after the evidence had been taken, the district court (under our laws as they now stand) found no difficulty whatever in adjusting the priorities of all of these parties, and in providing by its decree a method for the distribution among all of those found to have rights thereto the insufficient supply of water over which they were litigating. This was a celebrated case, and was watched with great interest by the public; and it is believed that the result thereof brought peace to the whole community and established firmly the rights of each claimant, protecting the same as against the trespass of any other claimant, and providing a method for the distribution of the waters in such manner as could hardly have been reached under any system of legislative enactment in any of the Western States or Territories. It was a satisfactory demonstration of the wisdom of the present status of the development of our Territory, simply announcing by legislative enactment the general principles, and leaving our courts to enforce the same by jurisdictional methods, as may be deemed equitable in each particular case.

The commission has not been unmindful of that part of the act creating the same, wherein it was directed to examine the laws of other States and countries, in determining what legislation should be recommended to the legislative assembly, and has made such study thereof as it was possible for it to make without going to the places where such laws were in effect. The legislation of such States and Territories has been carefully read, as have the decisions of the courts based thereupon; much that is admirable has been found to be incorporated in the legislation of nearly every State, along with much which it would have been best to have omitted, and in some instances it has resulted in great confusion of principles. The system adopted in each State has been found to be the result of the needs of that particular jurisdiction, and the conditions are more or less different in each State from those that obtain in any other State.

Much of this great system of laws would no doubt be of great benefit if the conditions to which the same is intended to be applied existed in our Territory, but in the opinion of the commission they would be valueless, if ingrafted into the law here, from the fact that the conditions, both as to soil, climate, water, and the disposition of the people are entirely different from those of the localities where such laws are enforced; indeed it is the varying conditions of nearly every section of this Territory, as to these essentials, which renders the work of your commission in determining what laws should be made applicable, a difficult one. General principles, of course, can be made to apply all over the Territory, but when it comes to the regulation of water rights and the rights upon which irrigation is dependent in detail, those which would be highly beneficial in one section of our Territory, would doubtless be found detrimental to other sections thereof, dependent upon altitude, climate, different character of the soil, and the necessities of the people.

After the fullest consideration which the commission has been able to make of the laws of our Territory, and those of the various Western States and Territories, it is our deliberate and unanimous conclusion, that the principles governing the law of water and the rights connected therewith in force in this Territory are sufficiently just, progressive, and simple, and that the courts have sufficient jurisdiction and authority at present to fully determine and enforce the same with justice to all, and that no change of any of the principles so enforced would be advisable; and it therefore recommends that no legislation with reference to any of such principles is at present advisable.

EXPENSES OF THE COMMISSION.

The following table shows the total expenses incurred by the commission:

To P. E. Harroun, engineer for commission, four and one-third months, at $200 per month	$866.66	
To P. E. Harroun, expenses while in employ of commission	102.90	
		$969.56
To expenses of members attending the various meetings of commission:		
George Curry	47.00	
George Curry	41.00	
Antonio Joseph	54.00	
J. E. Saint	20.30	
Frank Springer	6.50	
(W. A. Hawkins made no claim.)		
		168.80

Printing and stationery:		
Daily Citizen	$6.00	
Daily Citizen	3.00	
Democrat Publishing Company	9.00	
Democrat Publishing Company	6.00	
O. A. Matson & Co. (letter book)	1.00	
		$25.00
Typewriting for commission:		
Clara H. Olseun	19.35	
Clara H. Olseun	1.40	
R. L. Hunt	50.00	
		70.75
Total expenses of commission		1,284.11

No salary or compensation of any kind to members or officers of the commission is included, and, as will be seen by consulting the items, but a very small amount was incurred for personal expenses of members in attending the meetings. The principal expense is for the employment of the engineer. Of the foregoing expenses only the sum of $360.55 has been paid. By correspondence with the Territorial auditor it was developed that he was not satisfied as to his authority to draw warrants for the payment of the whole of the expenses of the commission. We recommend that an appropriation be made by the legislature to meet these bills.

By the foregoing statement of expenses it will be seen that work of the character already done and herein indicated as desirable for the future can be carried on with considerable economy. The total expenses so far incurred, including the employment of an engineer, is only $1,234.11.

We suggest that the work which we have recommended might be advantageously continued under the auspices of a commission something like the present one, consisting of men representing the different sections of the Territory, not confined to any political party, and serving without pay. Such commission to be authorized to employ a competent hydraulic engineer to make annual investigations, and reports to be submitted to each succeeding legislature. The expenses to be incurred by the commission to be limited to a definite amount and fixed by appropriation. In this way, at a comparatively small expenditure, a series of reports would be produced which would be of permanent value to the Territory.

Dated December 15, 1898.

Respectfully submitted.

ANTONIO JOSEPH, *President.*
JOSEPH E. SAINT, *Secretary.*
FRANK SPRINGER,
W. A. HAWKINS,
GEORGE CURRY,
Commission.

The legislative assembly, on March 16, passed the law known as the "Land bill," the following section applying to the commission of irrigation:

SEC. 34. For the purpose of facilitating the selection of lands donated to the Territory of New Mexico by the act of Congress hereinbefore referred to for the establishment of permanent water reservoirs for irrigating purposes, and for the improvement of the Rio Grande, and increasing the surface flow of water in the bed of said river, there is hereby created a commission of irrigation, to consist of five members to be appointed by the governor, with the advice of the council, to serve for two years and until their successors are appointed. Such commission shall elect from among their members a president and secretary. The members of said commission shall serve without pay or compensation. It shall be the duty of said commission to investigate and select the most suitable sites for permanent water reservoirs for irrigating purposes and for improvement of the Rio Grande, and also to designate such tracts of public land capable of irrigation from such reservoirs as would in their judgment be advisable to locate for the Territory under said act of Congress, in order to secure the benefit of the enhanced value of the lands resulting from the establishment and construction of such reservoirs, for which purposes they may employ all necessary expert assistants, and to certify the result of such investigation, selection, and designation to the commission and acting under said act of Congress for the selection of the

lands donated thereby. Said commission shall also, at least thirty days before the meeting of the legislature, make a report to the governor embracing all available information concerning the best method for improving the Rio Grande and increasing the surface flow of the water in the bed of the said river. Also concerning the subject of irrigation and water supply, the quantity of land in the Territory cultivated by means of irrigation, the extent of present and proposed system of storage reservoirs, the conditions existing in different parts of the Territory with reference to irrigation and water rights, and such other facts as they may deem proper, together with recommendations as to needed legislation on any of such subjects.

The necessary expenses incurred by the commission, to be certified by the secretary thereof and approved by the governor, shall be paid out of the proceeds of the land sold under this act which are credited to the fund for the establishment of permanent water reservoirs for irrigating purposes and the improvement of the Rio Grande: *Provided*, That the expenses provided for in this section shall not exceed fifteen hundred dollars for each year.

Under the foregoing section the commission was duly appointed, consisting of Hon. G. A. Richardson, Hon. Frank Springer, Hon. W. A. Hawkins, Hon. Pedro Sanchez, Hon. Levi A. Hughes.

The organization was perfected by the election of Hon. G. A. Richardson, of Roswell, N. Mex., as president, and Hon. Levi A. Hughes, of Santa Fe, N. Mex., as secretary.

I regard this as one of the most important boards in the Territory, and its work can not help but result in rendering great assistance toward promoting the interests of irrigation in New Mexico, besides the great good and benefits derived by the school lands donated by Congress.

MONEY IN IRRIGATION.

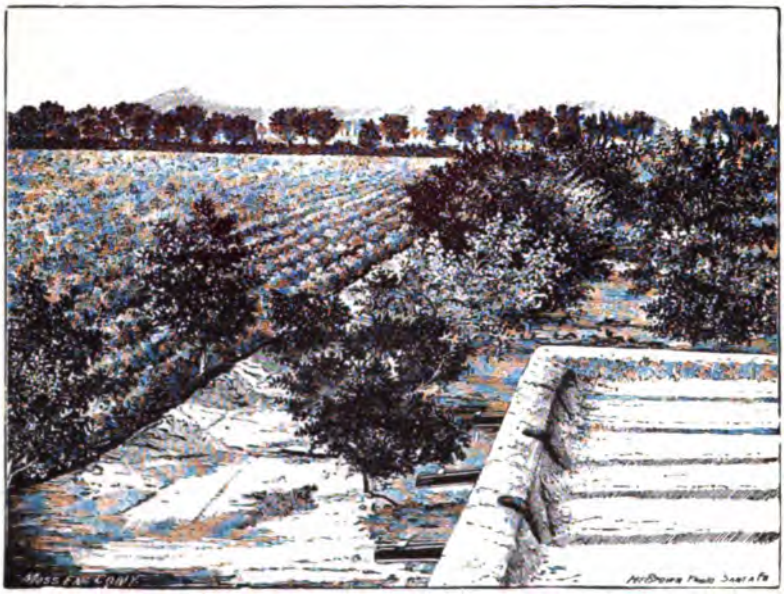
The improved systems of irrigation upon which New Mexico has to depend for the multiplication of her useful land area are developing rapidly, but there are still many opportunities for the investment of capital in irrigation projects, which can not fail under good management to make millionaires of the projectors.

There is in operation the Springer system of irrigation, with 50 miles of ditches and five reservoirs, covering 22,000 acres. The Vermejo system of irrigation, which controls 57 miles of ditches and 10 reservoirs, supplies 30,000 acres. In the northwestern portion of the Territory there are 200 miles of ditches, watering 24,000 acres. Here there are several tracts of fertile soil, accessible to streams which will afford an ample water supply, awaiting the attention of moneyed men. Also extensive ditch systems are in operation in the Mimbres region of Grant County.

The irrigation projects noted above are in the four corners of the Territory. In the meantime, the great central portions are receiving attention, more than fifty companies having been organized for irrigation projects, and several having plants in operation, affording to the home seeker at the present time ample opportunity for settlement and reclamation.

The valley of the Rio Grande presents the most extensive field for operations of this kind, as the present narrow strip of cultivated land can be widened very materially by a proper disposition of the water which flows so abundantly from the north, and is now allowed to be wasted. A few years will find all the water now suffered uselessly to run away, utilized to the highest degree and enlarging the area of the agricultural and horticultural land to an extent almost fabulous.

Meanwhile, individual enterprise is increasing the local supplies by the erection of multitudes of windmills, pumping from artesian wells



RANCH AND IRRIGATION RESERVOIR.

in various parts of the Territory. These prove the existence of great bodies of water underlying a large portion of the Territory. To the settler this means much, and will add in a great measure to the future possibilities of production.

THE NORTHWEST RIVER SECTION.

The San Juan River country, in the northwestern portion of the Territory, offers a splendid opportunity, not only for the production of cereals, but also for vegetables and fruits of all kinds. The vine thrives to perfection. The valleys of the Las Animas, La Plata, and Los Linos, all tributaries to the San Juan, are also capable of rendering large amounts of produce. The valley of the Chama River, especially in its upper part from Chama, on the Denver and Rio Grande Railway, to below Tierra Amarilla, the county seat of Rio Arriba, is one of the finest valleys in the country, and highly productive. And again, the valleys of the tributaries to the Chama, the Brazos, Nutritas, Gallinas, Puerco, El Rito, Ojo Caliente, Bear Creek, and others are all highly susceptible to cultivation. The valley of the Puerco of the East, and the Rio Jemez, with its many tributaries, afford fertile lands, already for centuries under cultivation.

ADVANTAGES OF IRRIGATION.

When the Eastern farmer sees all the work entailed in laying out a wheat field for irrigation and the subsequent labor of applying the water, he is often heard to exclaim, "If all that work is necessary, I have no use for irrigation." It is useless to attempt to disguise the fact that irrigation entails much expense in the cultivation of crops. Of course, that expense varies with the kind of crop raised; but the question may be asked whether the value of the extra quantity produced is not in excess of the extra expenditure.

Let us take the case of alfalfa. The yearly expense per acre for irrigation, as has already been shown, is $2.15; but four crops of hay are raised in the year in lieu of one without irrigation, or say 3½ tons instead of 1½ tons. The farmer therefore gets an extra 2 tons of hay for an expenditure of $2.15 in water. Add $2 for the cost of harvesting these 2 tons, and you have an extra 2 tons of hay, costing $4.15, or $2.08 per ton.

In the case of wheat crop it is not easy to give exact figures, but I have no hesitation in saying that the crop will be double what it is in countries where irrigation is not practiced and where fertilizers are not used. This is due in large part to the fertilizing properties of the river water, to which reference has already been made, which insures the permanent fertility of the soil. One must also bear in mind the fact that wheat and almost all farm products are worth more in the irrigated districts of the West than they are farther east.

No farmer would consider it a waste of money to put 10 tons per acre of barnyard manure upon his land every year, even though it cost him $6. For half this expense he can, where the river water is of the same quality as that which irrigates the Mesilla Valley, not only apply fertilizers equal to the contents of 10 tons of barnyard manure, but he gives the crop the exact amount of water required for a full yield, insures it against loss by drought, and gets a better price than could be obtained elsewhere. Irrigation farming means intensive farming; and it is intensive farms which pay in the long run.

If the question is asked, as it often is, What is the most profitable product to raise in New Mexico? the answer generally made is that apples, peaches, grapes, or some fancy crop will pay the most money, and dazzling figures are given showing the number of pounds per acre and cents per pound, resulting in a rapid fortune from 40 acres of land.

THE CANADIAN RIVER SECTION.

This agricultural district lies between the Raton Mountains on the north and the Pecos River on the southwest. The Canadian flows through it for about 150 miles in a southeasterly direction to near old Fort Bascom, and from there easterly (a little north of the thirty-fifth parallel of north latitude) for about 50 miles. Most of its tributaries flow in from the west. As the western part of this entire section has a slope toward the east with a general descent to the southward, the highest localities are in the northwest corner and the lowest in the southeast, with a falling altitude of from 5,000 to 3,000 feet. Some portions of this river have a fall of 9 feet per mile. Of its tributaries, the Little Cimarron and Vermejo creeks afford considerable breadth of arable land, the former having a valley from 25 to 30 miles long and from 1 to 6 miles wide, and the Vermejo one of the same length and about 2 miles wide. Both of these valleys are very fertile, with plenty of water for irrigation. The Rayado Creek has a good valley, but it is subject to overflows. Ocate Creek Valley, formed by erosion, is also very good agricultural land. The Mora River Valley is doubtless the finest in this section. It has a length of from 60 to 70 miles and a breadth of about 4½ miles. Its upper portion, from 8 to 10 miles in length, is about 3 miles wide.

GILA AND COLORADO RIVER SECTION.

This section embraces a belt of land of from 50 to 100 miles wide along the whole of the western line of New Mexico. It is watered by the Rio Puerco of the West and the Zuni River in the north, and by the Gila and its many tributaries and the Rio San Francisco in the south. There are rich and extensive valley lands along the bottoms of these rivers, the most fertile being that of the Rio San Francisco.

NEW MEXICO SOIL.

The soils of New Mexico, as a rule, are quite different from the soils of the Eastern States and possess many advantages not possessed by the latter.

The power of the soils to produce plants depends upon many conditions, among the more important of which may be mentioned a proper control of the moisture, the climate, and the amount of available plant food present.

In regard to moisture control, soils depending on irrigation for their moisture, as do those of New Mexico, have a decided advantage over soils depending solely upon rainfall. While the valleys of New Mexico have an average annual rainfall of probably some 10 or 12 inches, and the greater part of this usually comes in the summer during the growing season, it is still quite insufficient for the needs of ordinary farm crops, which must depend for the greater part of their moisture upon irrigation. The supply of moisture to irrigated soils is under almost absolutely perfect control, provided the water supply is constant. The advantages of such a control of the moisture must be apparent to anyone.

HOW TO OBTAIN TITLE TO PUBLIC LANDS.

The following information is furnished by the register of the United States land office at Santa Fe, N. Mex.:

There are nearly 57,000,000 acres of unappropriated public land in the Territory of New Mexico. Agricultural public land is subject to entry only under the homestead and desert-land laws. The homestead laws of the United States secure to qualified persons the right to settle upon, enter, and acquire title to not exceeding 160 acres of public land by establishing and maintaining residence thereon and improving and cultivating the same for the continuous period of five years. A homestead entryman must be the head of a family or a person who has arrived at the age of 21 years and a citizen of the United States or one who has declared his intention of becoming such, and he must not be the owner of more than 160 acres of land in any State or Territory. A wife who has been divorced from her husband or deserted by him can make homestead entry. Payment of $16 fees and commissions must be paid at the time of entry, and final proof can be made at any time when five years' residence thereof and a cultivation of a portion of the land can be shown. The cost of making final proof, including publication of notice, taking testimony, and commissions, is from $14.25 to $15. A party can, at the time of making homestead entry of 160 acres, enter 160 acres under the desert-land act. He will be required to pay 25 cents per acre at the time of making the entry, after which he is required to expend $3 per acre ($1 per acre each year for three years) in labor or money in improving the land and constructing reservoirs, canals, and ditches for irrigating and reclaiming the tracts entered; and the party may make final entry at any time prior to the expiration of four years on making the required proof of reclamation, of expenditure to the aggregate amount of $3 per acre, and of the cultivation of one-eighth of the land and making a final payment of $1 per acre.

BEET SUGAR IN NEW MEXICO.

The pronounced success in beet-sugar production in the Pecos Valley has occasioned widespread popular interest in the cultivation of sugar beets throughout New Mexico.

During the past three years, from beet seed furnished by the Agricultural Department in Washington, under the direction of the College of Agriculture at Las Cruces, the better class of farmers in the Territory have been raising sugar beets with uniform success. The fact is clearly demonstrated that on all the valley lands in New Mexico, with irrigation, may be grown the finest crops of sugar beets of the most satisfactory quality for the manufacture of sugar.

It appears that beets of large size, of small sugar content, may be grown almost anywhere with the ordinary attention given to a crop of corn or potatoes; but special conditions of soil and climate seem to be necessary to produce a crop of beets rich enough in sugar to be profitable for purposes of manufacture of sugar. In determining the presence or absence of these conditions, our Territory has occasion for congratulation in the zeal and good work of the College of Agriculture at Las Cruces.

Throughout the Rio Grande Valley, from El Paso to the Colorado line, results appear to be uniformly satisfactory. In the central portion of the Territory, in the high valley region about Santa Fe, the

conditions of soil and climate appear to be specially suited to this crop. Here the uniform temperature and almost perpetual sunshine during the growing season seems to develop a larger percentage of sugar in the beet than in almost any other section of the United States in which tests have been made. It appears from tests made at the experimental station last year that Santa Fe grown beets weighing over 10 pounds tested over 12 per cent sugar content, and smaller beets of less than 20 ounces contained more than 20 per cent of sugar.

The yield per acre with irrigation appears to be merely a matter of care and skill in cultivation and in handling the crop under our conditions of climate. The tendency in overirrigation is to produce a large beet of small sugar content. On the other hand, on the prevailing sandy clay soil about Santa Fe from 10 to 12 tons of small beets of large sugar content may be grown with even less water for irrigation than is usually given an average crop of corn. For sugar making the beet most desired should weigh less than 20 ounces and contain more than 15 per cent of sugar; and for the raising of this beet New Mexico has the necessary soil, sunshine, water, and cheap labor to successfully grow in almost any quantity desired. It is not alone in the production of sugar beets of superior quality that New Mexico invites the attention of the sugar-making interest in the country; her railroad facilities for delivering beets at a common point centrally located for the manufacture of sugar in the Territory are all that can be desired. Both at Santa Fe and at Albuquerque may be located sugar factories, convenient to the ample supply of good water, cheap fuel, the best of limestone in unlimited supply for factory use, and reliable local labor. The Rio Grande Valley, and especially in the neighborhood of Santa Fe, has been the home of a native population for many generations accustomed to small truck farming and gardening with irrigation, and are already skilled in the light labor required for the cultivation of the sugar beet.

It is rare indeed that all or so many of the conditions for successful beet-sugar production may be found in the same locality.

Nature has indeed been generous in endowing New Mexico in this particular interest.

CARLSBAD, N. MEX., *July 15, 1899.*

DEAR SIR: Your communication of the 1st instant duly received, and I take pleasure in giving you a concise statement in regard to the beet-sugar industry in our Territory.

The beet-sugar industry was started in the United States in the year 1887, with a production in that year of 30,000 tons of beets. From this small beginning it has rapidly advanced, especially in the last three years, bringing up the production of beets to over 1,000,000 tons, equal to over 100,000 tons of refined sugar, with factories working their full capacity daily for one hundred days during the year, this being a fair average of the length of the campaign of the numerous factories now in operation.

The State of Michigan has experienced the most rapid development, owing to the large State bounty given, and while I do not believe in State bounties, as you will see by the inclosed marked copy of my address upon the beet-sugar industry at the Trans-Mississippi Congress, recently held at Wichita, Kans., still, if other States do give these bounties, you can readily see the disadvantage it puts our Territory and other Territories and States under, where it seems impossible to get a bounty, and as long as these bounties do exist it will materially retard the development of the industry here, even if the sugar beet grows well and is of a good quality, since investors will always seek the locality offering the best inducements. The quality of the beet raised in any section of our country is not sufficiently superior to counteract the bounties paid by some of our States; hence the rapid development in the districts enjoying the fostering care of State governments. I mention all this as the principal reason why the industry has not grown in our Territory.

THE SUGAR BEET IN NEW MEXICO.

As early as 1891 it was known that sugar beets yielding a very high per cent of saccharine could be grown in New Mexico. In that year a number of samples grown in the Pecos Valley were shipped to the Department of Agriculture in Washington for analysis, and were found to contain an average of 14½ per cent of sugar, the richest beets giving 21.85 per cent.

New Mexico belongs to the section of high plateaus which, under proper cultivation, can be made to produce a phenomenally rich beet.

Experiments in sugar-beet growing continued in the Pecos Valley until 1895 with results so satisfactory that in the following year, 1896, the first sugar factory in New Mexico was built in Eddy, now Carlsbad.

The factory is now entering upon its fourth campaign. The past three campaigns have not been the financial success expected, owing to an insufficient supply of beets, due to the scarcity of farmers. The success in raising sugar beets is made in localities where the average acreage per farmer is not over 5. In Lehi, Utah, where the most continuously successful crops have been raised in the United States, the average is only 4. As an example, you can readily understand that 100 farmers cultivating 5 acres each will raise many more tons than five farmers cultivating 100 acres each. The sugar beet is rather a garden crop and requires considerable care to bring about the best results, and a man having only 5 acres is able to give the crop all the attention required, while a man cultivating 100 acres is bound to neglect the proper cultivation and care of it, at least on a large portion of the field. The beet crop repays handsomely the close, careful, and intelligent work put upon it. It is not uncommon to obtain a yield of 20 tons to the acre, although an average of 14 tons is considered exceedingly good.

The advantages of the soil of New Mexico for the growing of the sugar beet on a profitable scale surpass many localities in the United States, and under proper conditions—namely, a sufficient number of good farmers, who will not undertake too large an acreage and work wisely—I doubt very much if New Mexico has a superior anywhere, especially where irrigation can be applied. The number of days of clear weather, with good soil and an abundance of irrigating water, together with proper attention, should give a good yield every year, and our climatic conditions will give a richer beet than in the districts located outside of the arid regions, because it is well known that the sugar in the beet does not come from the soil, but from the clear atmosphere, and as we have more bright, sunny days here than, I believe, in any other sugar-beet district, our beets contain and will continue to contain a higher percentage of saccharine matter. Again, the dry fall and winter, together with the absence of hard frosts, allow the beets to remain in the ground until needed by the factory, thus doing away with the expense of siloing, necessary in Northern States.

As stated before, the sugar beet is a profitable crop for the farmer to raise. We pay $4.75 per ton for beets delivered to the factory. The freight charges are 50 cents per ton from any station on the line of our railroad. As most of our beets are delivered by rail, the farmer therefore realizes at least $4.25 per ton f. o. b. cars at his nearest station.

Contracts are made at the beginning of every planting season, thus guaranteeing a cash market to the farmer for his crop, which is in no way affected by the price of sugar or by any speculation. The cost of raising an acre of sugar beets up to harvest time should not exceed $12 per acre. The harvesting of the crop, including loading on the cars or at the company's sheds, should not cost over $1 per ton. A farmer can, therefore, realize a profit of from $15 to $35 per acre.

Lands in New Mexico are cheaper than in any other sugar-beet district, ranging from $15 to $30 per acre, which should also be an inducement to settlers to locate here.

Again, the season for planting is longer than elsewhere, extending from April 1 to July 1. This is an advantage in case of a mishap to the early planting, as it gives sufficient time for replanting in order to raise a good tonnage before the factory is ready for the beets. Our harvest commences in November. It continues, or would continue, with a full crop, until March 1, keeping the farmer busy during the months in which with other crops he is idle and when all other crops are harvested and disposed of.

The capacity of our factory is 200 tons of beets per day, and capable of producing 4,000,000 pounds of white granulated sugar. It is so constructed that it can easily be enlarged when necessary.

A beet-sugar factory is of lasting value to a new and growing community. Our factory during a four months' run pays out in wages about $25,000, to farmers

for beets over $85,000, to say nothing of the amounts paid for freight, coal, and other items of expense which put money in circulation.

Trusting that this information will enable you to sufficiently cover the subject of the sugar-beet industry of New Mexico, and offering you any further data desired, I am,

Very respectfully, ARTHUR S. GOETZ,
Manager.

Hon. MIGUEL A. OTERO,
Santa Fe, N. Mex.

THE CULTURE OF GRAPES.

Rio Grande Valley is well adapted to the cultivation of grapes. The principal kind now existing is the Mission grape, which was introduced by the Catholic missionaries as early as 1711, and has ever since proved to be the standard variety in this Territory, on account of the richness of its flavor, and the amount of sugar it contains. It makes an excellent red or white wine, and is equally valuable for the market. From experiments we know also that our Mission grape compares favorably with the French grapes for the manufacture of champagne.

With skill and good management it can not be surpassed. The cultivation of the vine has been practically taught to the natives, and their methods have proved ever since fully successful as to the covering, uncovering, cleaning, and pruning of vines.

There is no doubt that the soil of this Territory is splendidly adapted to the cultivation of the grape. Of late years a number of new varieties of vines have been introduced by various parties, and are doing well; nevertheless, they require the same methods of cultivation as does the Mission grape.

One acre, or 1,062 vines, will yield each year about 12,744 pounds of grapes, or 910 gallons of wine. This is considered a moderate estimate.

THE CULTIVATION OF THE GRAPE IN THE MESILLA VALLEY.

Among the natives the grape is the principal fruit raised in the valley, although many of the American farmers own good vineyards. The former grow the Mission grape almost exclusively, whereas the latter mostly raise the Muscat of Alexandria, Black Hamburg, Gros Colmar, Malvoisie, and other so-called California varieties, all of which thrive perfectly.

The grapes begin to ripen toward the end of July, and the shipping season usually lasts till about the last week in October. A great deal of wine is made, but it is usually more profitable to sell the fruit for table use. During the season large quantities are shipped, mostly in 10-pound baskets, to all the towns in New Mexico, and to many of the markets of Arizona, Colorado, Texas, Louisiana, etc.

The vineyards are usually started by putting a couple of cuttings during March every 8 feet each way, although many of the older vineyards are set at 6 feet apart. When the cuttings begin to grow, the weaker one is pulled out and the stronger left. The object of setting two cuttings is to make sure of one growing. At 8 feet apart each way 680 vines go to the acre, and this seems a better way or distance, than 6 feet apart, as it gives more room for cultivation. Some of the most progressive horticulturists consider that the rows 10 feet apart and the vines 8 feet apart in the row (544 vines to the acre) is still better.

What is known as the "stump" method of training and pruning is followed. This consists in staking the vine during the first two years, so as to form a straight, upright trunk. The first year the vine is allowed to grow as it will, when it is cut back to its strongest eye. The second year all the buds are rubbed off to the height of 15 or 18 inches, and at the next pruning the cane is cut back to 18 or 20 inches, leaving two or three buds as a basis for the future head. From now the "short spur" system of pruning is adopted; that is, the canes are all allowed to grow as they please during the summer, and at the regular pruning in March these canes are cut back to one or two eyes, from which spring the bearing canes. Of course as the vines get old too many spurs are made, and many of them too long, when some of them must be cut out altogether. Under this system most of the grapes seem to thrive very well, although there is a great deal of careless staking and training in the early life of the vines, resulting in difficult pruning later on, and many of the bunches get spoiled by the mud, owing to the want of good, straight, strong trunks to hold up the fruit.

There is considerable difference of opinion as to whether the grape-vines need to be hilled up during the winter in this valley. The old custom among the natives has been to cover the vines with hills of earth in the month of November and not to uncover until the following March, when it is time to prune. The mounds of earth are raised sufficiently high to just cover the buds which are to be left for the coming year. No irrigation is given during the winter, or until after pruning.

The object of this hilling up is not to protect the vines so much from the winter cold as from the cold, drying winds, which cause the trunk to crack and the canes to winterkill. It is, however, claimed by those who have tried it in recent years that if the vineyards be irrigated during the winter these dry, cold winds do no harm and the vines thrive better. Pruning is usually done in March, but earlier grapes are produced when the vines are pruned in the fall.

Undoubtedly much better results would be obtained if the vines were wider apart, better trained, and the surface soil kept well pulverized throughout the year. People taking up this industry would be well repaid for the care given their vineyards in the sale of their grapes at good prices—soon becoming independent.

VEGETABLES.

Most every kind of vegetable can be raised in this Territory except, perhaps, the Irish potato in some localities. The potato is a native of the mountain country in its wild state, and in the central and western parts of Socorro County, along the northern line of Colfax County, and extending southward for 100 miles along the base of the mountains, the finest potatoes in the world are grown. The raising of this crop requires very little work, and the yield is very large.

Turnips, carrots, ruta-bagas, and cabbage all do well. Of the latter, it is no uncommon thing to see heads weighing from 20 to 30 pounds, and occasionally one that weighs several pounds more. Cabbages are worth from 1 to 5 cents per pound, depending upon the season of the year when they are sold. Onions excel in size and flavor, and are a good paying crop.

FRUITS.

The fruit industry is coming to the front rapidly, and people coming to this Territory to settle learn that fine fruit can be produced here with much less trouble than in the States. There are many magnificent orchards in this Territory. The size and variety of the fruits raised would astonish and delight our Eastern orchardists. A large evaporator is now being built in Santa Fe.

Apples flourish luxuriantly. Pears, quinces, and plums appear to be in their native clime. The strawberry, currant, gooseberry, raspberry, and blackberry all thrive vigorously. The valley along the Rio Grande appears to be particularly adapted to all kinds of fruits, although all sections of New Mexico susceptible of cultivation will produce the finest variety of fruits, and most abundantly.

CEREALS.

Wheat, in quality, size, and quantity, is not excelled anywhere in the United States. Corn does well, and oats grow luxuriantly, but are generally cut green and fed in the straw.

TIMBER.

Both hard and soft pine, spruce, oak, cedar, walnut, mountain ash, quaking asp, box elder, cottonwood, etc., are all found in great abundance.

LUMBER INDUSTRY.

Extensive pine forests in New Mexico make the lumber industry here an important one. All over the Territory individuals are erecting sawmills, whose product is demanded and utilized by the people who use lumber for building purposes in the place of the ancient adobe. The profits of lumbering are large.

HORTICULTURE.

The first annual report of the New Mexico Horticultural Society, covering the year 1897, has just been issued. It contains an account of the fruit exhibit held last year in the city of Santa Fe and the efforts of the society to awaken an interest in horticulture and stimulate, by offering suitable prizes, the production of valuable varieties of fruit.

The exhibit referred to was highly successful. It brought together a display which in many respects was remarkable. It showed that New Mexico, in the variety of its fruit products, having regard to quality as well as species, stands in the foremost rank among fruit-producing parts of the United States. Some States may produce certain species of fruit of superior quality to any yet produced in New Mexico, but the same States may fall short in respect of certain other species in which New Mexico may excel; so that it is in the uniformly high grade of its fruits that New Mexico surpasses the other parts of the Union.

Horticulture is a business to which the people of New Mexico may well give great attention. It would be practicable for them to supply large quantities of excellent fruit to the markets of the Mississippi Valley and the lake region. The climate of their Territory will admit

NEW MEXICO APPLES.

UNIV. OF

of placing the products of their orchards and vineyards in the market at an earlier date than many competitive places, and care and experience in cultivation would in time enable them to produce varieties of a very superior grade.

Practically all the irrigated valleys of the Territory are adapted to fruit growing. The soil of the Rio Grande and Pecos valleys, for instance, is highly fertile, and irrigation has demonstrated its adaptability to both viticulture and horticulture. A good quality of wine could be produced by care in selecting the proper species of grapes. This has already been shown by what has been achieved in that direction. Altogether, the New Mexico Horticultural Society has an excellent opportunity for the accomplishment of a work of enormous value to the Territory.

Our horticultural fair was pronounced by all the most comprehensive and evenly balanced exhibition of fruits of all kinds ever seen, and it has stamped New Mexico as the most perfect fruit-growing section of the world, and while there are many exhibitions on a much larger scale and some which might excel in some particular fruit, there is none which includes such a splendid showing of fruits of all kinds. There is one very noticeable thing about the fruit of New Mexico, and that is it is entirely free from insects of all kinds, is firm, and of very fine flavor.

During the course of this fair it was visited by those familiar with the American Institute fairs in New York, with State fairs of the East, as well as those of Colorado and California, and all concurred that the fruit excelled anything seen before at similar fairs.

Among the exhibits were 246 entries of apples, 34 of crab apples, 125 of pears, 58 of peaches, 108 of plums, 13 of apricots, 37 of nectarines, 15 of quinces, 36 of grapes, 12 of nuts, etc.

When the premium list was published the criticism was made that the number of varieties of fruits required for the first premiums were so large that no entries of that character could be made. The schedule called for 40 varieties of apples, 40 of pears, 20 of plums, 5 of apricots, 5 of nectarines, etc. The result showed that our horticulturists are raising a much larger variety of fruits than was generally supposed, as in all the above cases the required number was actually exceeded.

Among the notable specimens were the following: Largest apple, weight, 23 ounces; circumference, 15¾ inches. Red Beitigheimer, weight, 18¼ ounces. Gravenstein, 14 ounces and 13⅜ inches. Russet, 13½ ounces and 13½ inches, etc.

Among the pears a Bartlett weighing 18½ ounces, and an Idaho weighing 18 ounces were noticed.

The Agricultural College (of New Mexico) exhibit showed a peach weighing 10¼ ounces, and a Pride of the Rio Grande weighed 10½ ounces.

A bunch of Muscat grapes, grown as far north as Espanola, weighed 25 ounces, though not ripe; and Stanwick nectarines from the same locality reached 5¾ ounces in weight.

No premiums were offered for vegetables and no provision made for their exhibition, but so many excellent specimens were brought in voluntarily that it is evident that arrangements should be made to include them as well as floral displays at subsequent exhibitions.

The horticultural fair which has just closed here was a great success from every point.

MEMBERSHIP AND INCOME OF THE NEW MEXICO HORTICULTURAL SOCIETY, INCORPORATED AS A TERRITORIAL INSTITUTION IN 1886.

The number of life members is 17; of annual members, 166.

As life membership practically cuts off future income, the society has decided to lay aside half of the sum received from life members as a permanent fund for the purchase of land or erection of buildings in the future.

The total receipts of the society during the past year were $712.40.

Life members	$150.00
Annual members	166.00
Admissions	169.45
Subscriptions	67.50
Donations	27.85
Premium, less expense	131.60
Total	712.40

AGRICULTURE—HORTICULTURE.

[George Vestal, agriculturist and horticulturist, New Mexico Agricultural College Experiment Station.]

AGRICULTURE.

Our agriculture is carried on by the aid of irrigation, and when water is plentiful abundant crops are produced. In San Juan, Rio Grande, Pecos Valley, and other parts of the Territory modern farms exist, and when well managed are profitable. When a system of storing flood waters is put in operation immense areas will be put into cultivation. Alfalfa is the principal crop raised, producing three to four cuttings each season, yielding 3 to 5 tons of hay. It is an excellent feed, and most work horses receive no other at any time of the year, and remain in good condition even when continually worked. Wheat is largely raised, principally by the Mexicans. Rye and barley also do well. The experiments carried on with sugar beets at this station and by farmers in different parts of the Territory during the past year conclusively prove that beets of the highest quality can be produced in nearly every section of the Territory. Beets were produced which showed 10 to 22 per cent sucrose, great numbers of the samples running 14 to 17 per cent. The cultivation of the sugar beet is susceptible of a great development. Kaffir corn has proved to be a good crop in this climate and is largely cultivated in some sections. There are many crops not now cultivated which would prove profitable if attention were directed to them. Many sections of New Mexico, by reason of altitude or other conditions, have climates peculiarly their own, which would prove well adapted to some particular crop which would suggest itself to any live farmer. One great advantage the farmer has here over the Eastern farmer is the ease by which he can preserve his crops. The dry, pure air retards decay to a great extent, and the absence of heavy dews and rains enables him to harvest and store his crops with but little waste.

HORTICULTURE.

It is in horticulture that New Mexico may expect her greatest development. The soil, when properly cultivated and irrigated, and the climate seem to be peculiarly adapted to the production of fine fruit. The soil is supplied with such essential elements for tree growth as lime, potash, etc., in such abundance as to be practically inexhaustible. These fertilizers form a large part of the expense bill of the fruit grower of the humid region. Our sunny climate produces a large, fine-flavored, high-colored, attractive-looking fruit, which greatly adds to its selling qualities.

The fruit industry of the Territory is still undeveloped. True, fruit growing has been largely carried on in San Juan County, the Rio Grande, and Pecos Valley, and large quantities of fruit have been shipped to near-by and distant markets, successfully competing with fruit from other States; but the large area comprising the small valleys, mesas, and level tracts, when supplied with irrigating waters, will produce such fruits as their climates will mature in larger quantities and to a greater perfection than any other part of the United States.

VEGETABLES.

Vegetables of all kinds reach their highest development in the parts of the Territory having climates favorable to their growth, and when properly cultivated yield enormously. The quality of our fruits and vegetables will compare favorably with those produced anywhere. The celery of Bernalillo and Chaves counties has gained a wide reputation for its crispness and fine flavor, and is quite largely shipped to adjoining States. The cabbage of northern New Mexico has been known for years to be as fine as can be produced. The tomatoes of the Mesilla Valley, when canned, are superior to any yet brought to this market, and the demand for them is rapidly increasing.

TEN ACRES ENOUGH.

[W. S. Burke.]

WHAT A MAN CAN DO WITH A SMALL TRACT OF LAND UNDER IRRIGATION.

Sweet potatoes of most excellent quality yield abundantly in all the valleys of the central and southern portions of the Territory, and constitute one of the best crops that the farmer can raise, because they enable him to realize a good return for his season's work from a very small tract of land, which is an important consideration to a farmer anywhere, but especially so to one in an irrigation country. The soil and climate of this country seem to be peculiarly adapted to the growth of the sweet potato; the quality of the product is fully equal to that of the famous potatoes of New Jersey, and a fair average crop will give from 900 to 1,000 bushels to the acre with proper cultivation. They never sell for less in the fall than $1 a bushel, and those that are kept into the winter usually bring as much as $2. From this it will be seen that 1 acre cultivated to sweet potatoes in New Mexico will yield the farmer as much money as he can hope to realize in a good year from 80 acres of corn or wheat in Kansas or Nebraska, and since the results are to be measured by dollars and not by acres, it will be apparent to anyone that the irrigation farmer, although he may not be able to cultivate fields as broad as those of his neighbor in the rain belt, has a better prospect of success and a decidedly better chance of a bank account at the end of the year.

The onion is another product that seems to be peculiarly adapted to this section of the country. The large white Spanish onion, which grows to greater perfection in the Southwest than anywhere else in the United States, affords one of the most profitable crops that can be grown in this Territory, and requires irrigation to bring it to perfection. On account of its beautiful silvery color and its peculiar mild flavor, this onion finds ready sale in any part of the country, and always brings the highest market price. The yield is about 500 bushels to the acre, under proper cultivation, and the price at home ranges from $1 to $2.50 per bushel.

Celery and asparagus are also articles which are especially adapted to the soil and climate of this country, and attain here a degree of excellence rarely found in such articles grown elsewhere.

The New Mexico celery is far superior to that grown in California, and is pronounced by all who try it fully equal in all respects to the famous Kalamazoo product, which is noted throughout the country for its superiority.

And when it comes to asparagus New Mexico can fairly claim to "beat the world," for nowhere else on the American continent is there raised asparagus which can at all compare with that grown in the valley of central and southern New Mexico. In many places there are large quantities of saltpeter in the soil (the American settlers call it "alkali," because it comes to the surface after a rain and makes the ground white, causing it to resemble the alkali of the north). This article, which is deleterious to many kind of vegetables, is the favorite food of asparagus and obviates the necessity of applying salt to the ground, as has been done wherever this vegetable is grown in the Eastern or Middle States. It also causes the plant to attain a degree of excellence and flavor in this country which is unknown elsewhere. During April and May, the months when the cutting is done, the shoots will attain, under favorable conditions, a growth of about 6 inches in a day, every particle of which is edible; there is no woody portion to be thrown away; the whole stock is as soft and tender as green peas, and the flavor is proportionately superior. Sample lots of New Mexico asparagus have been sent to many parts of the country, and the verdict is everywhere the same, "The best I ever saw." It is not only better than that grown in the East, but is so much better that its superiority is noticeable at once, even to the casual observer. Actual experience has shown that it will bear shipping to Portland, Me., and that is as far away from New Mexico as you can get in the United States; so the whole

country is open to us as a market, and that the article can be sold wherever it is introduced goes without saying—it will sell itself.

An asparagus bed of 1 acre will yield, after the third year, about 200 pounds a day for sixty days, which is as long as it is wise to cut it; this will bring an average of 10 cents a pound during the season. An acre in sweet potatoes will yield 900 bushels, worth $1 a bushel at least, as soon as they are dug. An acre of onions will yield 500 bushels, worth never less than $500, and an acre of celery can be relied upon to bring as least $600. A man needs 2 acres in alfalfa and 2 in corn or oats for his horse and cow and 2 acres for house lot, orchard, and kitchen garden. That makes 10 acres in all, which is as much as any man needs to farm for profit, and is fully as much as the most industrious man can cultivate properly. There is an abundance of good land for such purposes to be had in all parts of the Territory. Take, for example, the Rio Grande Valley, the oldest portion of the Territory in point of settlement, a section that has been settled for more than three hundred years, and yet not one-fourth of the available land in this section of the country is under cultivation at the present time. Beginning a little above Bernalillo and going down to a point a little below San Marcial, we have one of the most desirable and fruitful sections of the famous valley and lying right in what may properly be called the agricultural center of New Mexico, a district of about 150 miles in length and with an average width of about 5 miles, embracing 750 sections, or 480,000 acres; and yet a careful writer, who has traveled frequently over the district of country in question, says: "If we concede that one-tenth of the land is now under cultivation, we are making a very liberal estimate." But if we should almost double this very liberal estimate, we should still have in the district referred to about 400,000 acres of unused land—enough to furnish homes and profitable employment to 400,000 families, or more than the entire present population of the Territory. And there is no waste land in this district named; it is all arable and all tillable and needs only the application of water to make it as productive as the best land in any part of the world. The Rio Grande carries water enough for the cultivation of the whole of this tract without encroaching in the least upon the rights of those who live farther down the river. True, there would not be water enough under the system of irrigation at present in use—a system that was adopted three hundred years ago, when economy in the use of water was something wholly unknown and totally unnecessary, and under which the water wasted is at least five times as much in quantity as the water used—but it is not to be supposed that this system will continue many years longer. Modern systems of irrigation are being introduced in all other sections of the country where farming is done by irrigation. New Mexico will not remain long behind the times. The system practiced in California and Colorado, and in the Pecos Valley in our own Territory, which puts the water upon the cultivated fields and not upon the waste places and the wagon roads, will soon be adopted in this section, and then, as we have said, the Rio Grande will furnish water enough to irrigate all the lands in its valley and will support more people than are now in the whole Territory.

A country like New Mexico, where all kinds of fruit and vegetables can be grown to such perfection and in such profusion, is the place for canning factories, and it is safe to say that there is hardly a settlement in the Territory in which there is not at the present time a good opening for an establishment of this kind. The genial climate, the long seasons, the almost perpetual sunshine, and the rich soil, which is further enriched at every irrigation by the valuable sediment which is brought down from the mountains, all combine to produce conditions which are not surpassed in any part of the world for the successful growing of garden vegetables, and the yield of these is so enormous that it would hardly be believed by anyone who does not possess a practical knowledge of the subject. There is a reliable home demand for all such products, and everything of that sort that can be grown here will be needed to supply the wants of our own people; but there are comparatively only a few vegetables that can be kept for winter use without preserving or canning. It is a well-known fact that the people who live in the cattle and sheep camps and the mining camps and villages of the West are the largest consumers of canned goods in the world; many of them practically live out of tin cans. The area of country in the Southwest that can be used for mining and grazing purposes is so much greater than the area that can be cultivated, and such a great number of people must always find employment in those occupations, that all the vegetable products of the country will always find a ready market at home. But, as is well known, it is necessary for the greater part of these products to be canned in order to be utilized. At present we are not producing one-fourth of the vegetables we consume for want of proper facilities for preparing them for market, and while we are able to produce more and better

vegetables than any other section of the United States, our people are fed mainly upon the inferior products of other sections. If this condition of things had to be permanent it would be rather discouraging; but it will not continue very much longer; the good openings that are presented in all parts of the Territory for the establishment of canning factories will soon be taken advantage of by men who are looking for good business opportunities. The only reason why such industries have not already been established in all sections of the Territory is the fact that our present careless and haphazard system of irrigation renders the supply uncertain; but given a reliable modern system, such as will soon be introduced in every section where there are intelligent, progressive people, and it will be but a little while before we have canning factories enough established in the Territory to take care of all the vegetables we can raise, and the large sums that we now send abroad every year to pay for stuff that we buy from other sections will be kept at home for the benefit of our own people.

With respect to canned goods, woolen goods, and all other articles which can be manufactured successfully here, we will not only have the advantage of a market at home for all we can produce, but the Territory is so far away from any other manufacturing center that the cost of transportation on goods shipped in from abroad is great enough to give the home manufacturer a good "protective tariff" which no Congress can repeal.

CANAIGRE.

An industry that is exclusively adapted to the arid Southwest, and especially adapted to New Mexico, is the production of the canaigre plant.

The following extract from Bulletin No. 21 of the Arizona Experiment Station will give the information asked by many as to whether canaigre may be grown in their respective localities:

The best conditions for the growth of canaigre are a cool but not freezing climate, a moderate amount of moisture, sandy, fertile soil, and probably also a sunny and arid atmosphere. These conditions are nowhere combined more perfectly or for a longer period of the year than during the six or seven cooler months in the arid Southwest. * * * A mean temperature of about 70° or less is required for the growth of canaigre. Above this, even though there be abundant rain, as was the case in August, the roots will not do more than sprout feebly, and various attempts to make them grow in warm weather have failed. This seems to limit canaigre to the Southwest, for nowhere else, excepting possibly in some of the Southern States, is there so long a period of mild weather. It has been grown experimentally in Florida with some success, but in the Northern States the interval between the severe cold of winter and the extreme heat of summer is too short to allow of much root development. The sprouting of the roots in August, under the influence of rain, suggests that, in the culture of canaigre, one or two summers would prepare the plant to grow more promptly on the advent of cool weather.

The growing plant will stand a good deal of cold. When frosted the leaves lie prostrate on the ground, but immediately regain position when thawed out by the sun. The root also will endure freezing. It has been left in the ground all winter 60 miles north of New York City, subjected to a temperature as low as 15° below zero, without injury. At Lincoln, Nebr., the roots stood a very severe winter without any damage whatever. At Peoria, Ill., plantings made in 1892 were still alive in 1895, and similar results are noted at Washington, D. C., and Garden City, Kans. The new root development, however, is stated in a number of cases to be insignificant under such conditions

As to locality, canaigre is found more commonly in sandy washes where water is more abundant. With irrigation it will make a good growth in any fertile, tillable ground, but the influence of soil conditions on actual production has been little studied. It seems to stand considerable alkali, and is even reported in the salt-grass meadows of Tia Juana Valley, near San Diego, Cal.

The tanning materials in canaigre remain pretty constant throughout the growing season, with, however, a small but distinct increase after the plants become established in vigorous growth. The amount of this increase in mature roots from year to year was further shown by taking four samples of wild roots, comprising every age up to about 5 years, dividing the samples as nearly as possible into successive years' growth and analyzing. It was found that the average increase of tanning materials from year to year, in ten instances, was 1.64 per cent in water-free material. In one set of cultivated samples the averages of the first and second year's roots differed 2.64 per cent. This indicates a small but constant

increase in the per cent of tanning materials from year to year, but holds true only so long as the roots retain their vitality. When they die the tanning substances quickly disappear. Although the percentage does not increase remarkably from year to year, the roots themselves become larger, so that the actual amount of tanning materials is much greater.

A factory for extracting tannin from canaigre is located at Deming, 230 miles from Albuquerque, and directly tributary to El Paso; but arrangements are made to start a tannin factory at San Antonio, N. Mex. Parties interested have been very busy in San Antonio for the past several weeks taking options on land, selecting a site for the factory, and perfecting other arrangements attendant upon immediate construction.

The factory at Deming has been depending upon its supply of canaigre from the wild root which grows in the greatest abundance in southern New Mexico, and is gathered by the natives and shipped. Now, however, it is proposed to cultivate the plant, and already options have been secured on 3,000 acres in the immediate vicinity of San Antonio, with 2,000 acres more to follow, thus making 5,000 acres altogether. This immense tract of land will be placed under a complete system of irrigation, for, although the canaigre plant grows wild in the most arid regions, it takes five years to assume mature growth, while under irrigation a good crop can be produced annually. Canaigre grows only six months in the year, and, strange to say, this is during the winter season from October to April. This plant has been used by the Mexicans for centuries in tanning their leather, but always in a dry form. Now, however, there has been discovered a process by which the acid can be extracted from the green root so that a new supply can be taken from the fields every day and converted into tannic acid, thus making the root worth from $80 to $90 per ton in any market.

San Antonio was selected as the most suitable place on account of its irrigating facilities and its rich coal fields. The coal mines of the Hilton Mercantile Company lie not very far distant, and the fuel can be had at a very nominal rate. The factory will employ 50 or 60 men, while the cultivation of the plant will give work to an additional force of 250 men. The capitalists who are interested, it is said, will spend a quarter of a million of dollars before they get the factory in running order. This will undoubtedly make it one of the most important enterprises in the Territory, and will mean a great era of prosperity for the San Antonio Valley.

CELERY PRODUCTION.

A product in which the Pecos Valley is gaining special distinction is its celery. It is an industry which is developing rapidly and constantly acquiring new markets. The most extensive production of this delicacy is near Roswell, on the Spring Brook Celery farm. The farm is watered by a great spring of water bubbling from mother earth, which, combined with the continual sunshine peculiar to the Pecos Valley and the saline nature of the soil, makes a combination for growing a high grade of celery not possessed by any other country. The constant sunshine, which blushes the apple, crimsons the cherry, ripens the golden grain, colors the flowers, and flavors the fruits with the choicest essence of nature's brewing, is no less potent in storing up those essential qualities in celery that raise it to a standard excellence, surpassed by none, equaled by few, and may be well said to bear the same relation to the celery trade as gold to the monetary system. The celery raised in the Pecos Valley is pronounced by those qualified to judge superior to that

raised anywhere else in the United States, and the fact that it leads all competitors in every market it has reached would seem to verify the assertion, particularly when it is known that it came in competition with the product of the most famous celery farms in the whole country. The soil of the valley seems to possess to a marked degree the constituents which impart to this table delicacy the peculiar nutty flavor so much sought after by epicures. The Spring Brook farm has proven a full success, both in the production of the vegetable and in marketing it to financial advantage. The Roswell Register notes this fact in a recent paragraph, which says:

W. M. Farmer has just received returns from his last shipment of celery. The total figures show that, in addition to supplying the local demand, he shipped out 88,815 pounds. The express bill on this was $1,389.80. The gross income realized at the farm for the crop of 20 acres was over $6,000.

The planting on this farm has been increased to 25 acres this season, while all over the valley farmers are putting in beds of greater or less extent.

FANCY TOBACCO SEED TO BE DISTRIBUTED AMONG NEW MEXICAN FARMERS BY THE COMMERCIAL CLUB OF ALBUQUERQUE.

The following letters relative to the culture of tobacco have been received by the Commercial Club of Albuquerque, and the seed mentioned is now at the club rooms awaiting distribution. The seed will be issued in small quantities to all farmers who wish to raise tobacco and who will agree to give the intelligent care and attention necessary to insure successful cultivation. The letters are self-explanatory:

CHICAGO, ILL., *December 22, 1897.*

COMMERCIAL CLUB, *Albuquerque, N. Mex.*

GENTLEMEN: Not long ago Mr. Chambers, general freight agent, sent me a sample of the tobacco raised in the vicinity of Albuquerque, which I sent to an expert grower in Virginia, who reports on same as follows:

"The tobacco you sent to me has an excellent flavor, but owing to the fact that it was cut before being thoroughly ripe, it cured up green. In as dry a climate as New Mexico, with the proper kind of seed to begin with, tobacco ought to cure a splendid bright-red color without using any fire at all. But in order to get the right color and flavor, two things are necessary—the right kind of seed, and allowing the plant to become thoroughly ripe.

"In New Mexico the plant bed should be made in February, and should be from 20 to 50 yards square, according to the size of the crop contemplated, and should be irrigated. The plant bed should be gotten in thorough order and the seed should be sown in it by the 1st of March.

"The plant should be ready to set out in June, and, if the ground is in good order, one rain or one irrigation will make the crop. Tobacco requires less water than any other plant I know of. The great trouble with us is that we have too much rain, which makes it cabbage or bunch up. If we could have moisture just when we wanted it, and not too much, and such soil as you have in the West, we would make the finest tobacco in the world.

"Hoping to hear from you soon, I remain, your friend,

"W. G. PILKINGTON."

Comment is unnecessary. Tobacco is one of the most important and most profitable of crops. On the strength of the opinion above given, by one qualified by long experience as a grower and manufacturer to speak knowingly, I would warmly advocate your body's taking up the matter of careful experimentation in tobacco culture, with a view to its becoming established on a sound basis as one of New Mexico's products. I will be glad to render any assistance in my power to that end. I have written for information as to the best seed to use.

Very respectfully,

JAMES A. DAVIS,
Industrial Commissioner, A., T. and S. F. Rwy. Co., Chicago, Ill.

ALFALFA HAY.

The remarkable development in the West of the species of hay known as alfalfa, within the past few years, can not fail to interest the farmer immigrant. Special attention is now given here to the cultivation of that crop, and it has proved a great success. It is a plant of wonderful power of growth. As a rule, three cuttings a season are made in the North and five in the South, which will average for the season one and a half tons per acre to each cutting.

It is a species of lucern, a perennial, an enormously prolific grower, containing a very high percentage of nutritive matter, and is of such a hardy, aggressive character that once it is firmly rooted it requires little attention other than an occasional irrigation and harvesting of the heavy crop of hay which it produces. It is the fodder plant of this region and the one factor that will permit stock raising and fattening to be successfully carried on upon modern scientific principles, in what has heretofore been known as the "arid region."

Formerly, from the want of some cheap fattening food, the far West was entirely dependent upon the agricultural States for its fattened beef. Cattle were shipped from New Mexico to Kansas or Missouri, fed there on corn, and then sent back as beef in refrigerator cars, to be eaten, perhaps, close to the place in New Mexico from which a few months previously, the thin ox had been shipped, thus necessitating a double journey of 600 to 1,000 miles, and an additional expense of 4 to 6 cents per pound for carriage alone. To-day a good percentage of the beef eaten in New Mexico is fattened here on alfalfa, and in the future, as more land is placed under irrigation, the proportion will be largely increased, for the profits are necessarily large, the cost of the double journey of the corn-fed beef being so greatly in favor of the New Mexico farmer.

Another, and perhaps a greater, revolution is being brought about by alfalfa, enabling New Mexico farmers to breed high-grade and thoroughbred bulls. Formerly ranchmen were obliged to go to the Middle States for the large number of high-class bulls they required for the improvement of their herds. The acclimatization of these upon the Western plains was accomplished by enormous loss, chiefly owing to the great difference in climate and pasture. To-day, with the aid of alfalfa, breeding such cattle is fast becoming an important industry in New Mexico. The climate here being the same and the grass similar to that upon the great cattle ranges, the mortality during acclimatization is slight, and cattlemen willingly give a higher price for a New Mexico than for an Eastern bred bull.

Another important consideration to the advantage of this grass is that as cattle can largely depend upon the nutritious native grasses during the winter, the New Mexico farmer has three great factors in his favor: First, a higher value for what he raises; second, less cost of production; and third, a practically unlimited market at his door, with no heavy freight charges to pay when shipping to the buyer—a combination of advantages that must soon drive his Eastern competitor out of the market, and leave alone in his hands a large and profitable business.

For all these reasons there will, for a long time to come, be an immense demand for alfalfa for cattle-raising purposes.

The same conditions apply to hog raising, and with equal force. It will doubtless sound strangely to the Eastern farmer to be be told that hogs are here fattened for the market on alfalfa hay, but it is neverthe-

ALFALFA FIELD IN BLOOM.

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less true, and the meat thus produced is fully equal to, if not better than, corn-fattened pork. It seems to be as good for hogs as for cattle. It is becoming the rule here, and such hogs command high prices, as "hog cholera" is not known in these mesa regions.

Alfalfa is a perennial plant, and when once sown will last for many years. It is difficult to say how long it is profitable to keep the same field in alfalfa, but there are many instances of land that has borne crops of alfalfa for twenty years, and even for a longer period, without showing any signs of depreciation.

The seed is usually sown in February, on land already seeded to wheat, and oats are also frequently sown with the alfalfa in order to act as a shade to the young plants. But quite as good results have been obtained by sowing the alfalfa alone. The seed may also be put in the ground at the end of September. The young plants will soon appear above the ground and will continue to grow, in roots if not in leaf, during the greater part of the winter.

The cost of seeding an acre of land with alfalfa, from an estimate made in the Mesilla Valley, is as follows:

Plowing and harrowing	$5.00
Drilling seed	1.25
Making borders for irrigation	2.50
Twenty-five pounds of seed, at 8 cents	2.00
Total	10.75

The annual expense will be:

Cutting, raking, gathering, and stacking 3½ tons, at $1	$3.50
Irrigating six times, at 15 cents	.90
Water per acre	.75
Cleaning lateral ditches	.50
Baling 3½ tons, at $1.35	4.72
Hauling to railroad 3½ tons	3.50
Total	13.87

This makes the cost of the hay in the stack $1.60 per ton and not quite $4 baled and delivered on cars. Hitherto most of the alfalfa has been sold as hay, but much better returns are obtained by feeding it to live stock, for raising hogs, and dairy produce, which undoubtedly constitute the best products for the farmer. Alfalfa usually gives four cuttings in the year, but with care and plenty of water it would be possible to get five cuttings, yielding altogether five or six tons of hay. Owing, however, to a somewhat slovenly method of farming and the occasional lack of water, the writer places the average yield in the valley at 3½ tons per acre.

MAKES GOOD PORK.

Wherever alfalfa can be raised the best as well as the cheapest pork and bacon can be produced, for alfalfa gives growth to the muscle, making the lean meat that is the best and sells the best. And while growing in the alfalfa fields the hogs get the exercise needed for healthy development. Wherever it will grow it may be made a highly profitable crop, and one that will get out of the swine industry its biggest possible results.

RANGE GRASSES.

There are about thirteen or fourteen different plants indigenous to New Mexico that, curing on the stalk, without cutting or labor of man,

comprise the great bulk of the valuable fattening food for range stock. A short description of each is given below.

The majority of the native, uncultivated forage plants of New Mexico are grasses, and the others, such as sotol and prickly pear, impress one as rather queer stock foods. The grasses of this class belong to two different groups—those which grow in the moist and alkaline soils of the valleys and those which are found on the mesas, and whose only supply of moisture is the little rain that falls during the year. Where irrigation is possible the best of all forage plants—alfalfa—can be raised in such great abundance that the cultivation of few other hay or fodder crops is attempted.

Hilaria mutica (Galleta grass).—This grass is found principally upon the high planes on both slopes of the Rocky Mountains. It is also known in localities as "black grama;" is a perennial grass, spreading by means of thick, scaly, underground stems, the roots of which are very nutritious, and stock seem to relish them.

Paspalum distichum (joint grass).—This grass is also known as "knot grass" in some localities. It is adapted to warm, moist soils of alkaline tendency, and in New Mexico is most abundant on low lands that are flooded occasionally, and upon the ditch banks late in the season. It is cut by the natives, to be fed green to stock before corn has matured. This grass is said to have some medicinal qualities.

Eriochloa punctata (Hamil).—Irrigated but uncultivated fields usually produce an abundant crop of the above-named grass each season. After the corn is "laid by," or during what little rain we have in the summer, this grass appears in the cornfields, along the ditch banks and the fence rows, and makes very rapid growth during the hot days of August and September. It produces an abundance of seed, and will reseed the ground each year. Land once seeded with it would produce a crop of fair hay after a crop of wheat has been taken off, and, so far as judged from an analysis, should be a valuable forage plant.

Panicum crus-galli (barnyard grass).—This rapidly growing annual is widely naturalized over the western and southern parts of the United States. As is indicated by its great geographical range, it has great powers of adaptation to climatic condition and is very variable, two well-marked varieties being recognized. It varies in height from a few inches to 5 feet and over, but the usual height is 3 feet. The natives cut this grass and feed it to their stock while green, before the corn matures. There is a difference of opinion as to the value of this grass as a hay crop. Some think it very valuable, while others think it worthless. It would be excellent to feed with alfalfa, and the two properly mixed would make a first-class combination.

Panicum obtusum (grapevine mesquite).—This is one of the native Southwestern grasses, found generally in the rich, loamy bottoms of the river courses, very rarely appearing on the mesas. It is a perennial which spreads rapidly, grows about a foot high, and produces a rather strict panicle of flowers. Stock seems to relish it. It does not grow tall enough to cut for hay, but would make a very fine pasture grass if supplied with water; its habits of growth and its great vitality would tend to prevent its being tramped out by stock.

Muhlenbergia texana (Texas drop-seed grass).—This is a perennial, growing upon the mesas and the dry rocky hillsides. It is sometimes known as the "grama grass," and is probably as valuable as any of the true grama grasses; it is also called "mesquite grass." This plant rarely exceeds a foot in height, but it is a grass that is much relished

by stock on the range. Occasionally, when the summer rains have been heavy, it is cut, cured, and baled along with the grama grasses and others, and makes a very valuable hay.

Lycurus phalaroides.—This is a common grass, and is usually found on the rocky ridges and hills of the plains, and not rarely in the mountains. It has been collected at an altitude in New Mexico of over 6,000 feet above sea level. It grows in bunches under the most favorable conditions to a height of 18 inches. It would only be valuable for stock when fed with something containing much protein and fat.

Sporobolus airoides (bunch grass).—This is one of the commonest of all the native grasses in the western United States, and is found in all arid portions of the Rocky Mountain region from Montana to Texas and west to California. It is perennial, forming dense tussocks on flat, dry, alkaline plains. While it is of no value as hay, it is considered a good pasture grass in some sections, and it certainly is of great value upon those alkaline "flats," which will support few other kinds of vegetation, since it flourishes in such localities, and stock relish it.

Dr. Rothrock says that this grass and another closely related species (*S. cryptandrus*) furnish a fiber which might be utilized in making paper or cordage.

Bouteloua oligostachya (blue grama).—This is the common grama, and is also known as "mesquite grass" and is frequently mistaken for the "buffalo grass" (*Buchloe dactyloides*), with which it at one time formed the bulk of the pasturage upon the western plains and ranges. With the increased number of animals upon the ranges these grasses are being somewhat killed out, since they are very rarely allowed to seed, and thus few new plants are produced each season. It is a perennial, growing in small, dense clumps. It is not considered a very good grass for hay, but it is frequently cut and cured when standing with other grasses; but as a pasture grass it is probably the best of all native grasses. It is not easily tramped out and requires only a small amount of water. It grows rapidly and cures standing, and stock prefer it to almost any other rough food even when dry.

Bouteloua polystachya (six-weeks grama).—This is a common name applied to two species of the genus Bouteloua, which are quite common and similar in character, and the two usually appear together Both are annuals, and spring up in the open mesa just after the summer rains, and grow very rapidly, maturing in about six weeks. Under the influence of these grasses, plains that were entirely bare will turn green and become valuable pasture land in a very short time. It is considered a very nutritious grass for stock.

Bouteloua eripoda (woolly-jointed grama).—This grass is also known as the "black grama," and forms a large portion of the native forage of this district. It is somewhat different from the other perennial gramas in habit, growing more like the six-weeks gramas. It does not grow in bunches or clumps, but is rather diffuse. It gets the name of "woolly-jointed grama" from the fact that the internodes or "joints" of the stems are thickly covered with silvery white hairs. Late in the season the stems become dark colored, and from this it gets the name of "black grama." The analysis of this grass indicates that it is not so good a food as most of the other grasses, since it is particularly poor in protein.

Bouteloua curtipundula (tall grama).—The tall grama or "hairy mesquite grass" is perhaps the most widely distributed of any of the grama grasses, being reported from nearly all of the States west of

the Mississippi River and from several east of it. It is usually found on rocky hillsides and along the bases of the mountains, though it is not uncommon in the valleys and on the higher parts of the mountain ranges, having a vertical range of three or four thousand feet. It cures as other native grasses do, and is considered a valuable feed by stockmen. Stock of all kinds eat it readily. It is frequently cut with other grasses by those who use and sell wild hay in this Territory. It has been recommended by good authority as an addition to the pasture grasses of Tennessee, and is said to be cultivated to some extent in the Southern States and to be much prized.

Eremochloe kingii Watson.—This is a small grass. It seems to be well fitted to the climatic conditions of high, dry, and hot plains. It produces a crop every season, no matter how little rain falls. Its nutritive ratio of 1 to 11.6 is much better than that of corn stover, and indicates that it may be a moderately good food. The plant is small and tough, and stock seem to eat it only when there is nothing else left. Its main value appears to be in the fact that it is almost sure to produce a crop when other grasses fail.

Distichlis spicata (salt grass).—This is the true salt grass (also known as alkaline grass), and it certainly deserves either name, since it forms a thick sod over these marshy, alkaline "flats" and "draws," which are of comparatively frequent occurrence in this Western country. It grows well where alkali covers the surface of the land with a thick, white crust, provided there be sufficient water to supply its needs. It is cut in some localities, making a poor hay, but in this Territory, as far as is known, it is only used for a pasture grass. Animals eat it readily while it is green, but it should not be fed by itself.

A description of a number of other varieties of forage plants might be given if it were not for lack of space, and I will only mention the names of a few others, such as the Millo maize and Kaffir corn, Italian millet, Pearl millet, alfalfa (on which quite an article appears in this book), mesquite, tornillo, prickly pear, and sotol.

I mention these grasses more fully than I would do, because in many instances the newcomer in New Mexico is impressed by the apparently barren stretches of mesa which surround the valleys. He is told that stock raising is one of the principal industries of our Territory, and he immediately wonders where the food of all these cattle, sheep, and horses is obtained. But the dry, barren mesa produces much valuable forage, and, with the increase in numbers of the stock upon the range, the animals have acquired the habit of eating anything in the way of vegetable matter which is at all digestible or nutritious.

SOME GOOD THINGS ABOUT ALFALFA.

Alfalfa benefits lands for cultivation by opening up channels through compact substrata to a considerable depth, allowing the entrance of water and air. The roots have penetrated the most compact soil, and their power to enter through clay and hard streaks is great enough to make them excellent subsoilers. The soil of a field which has been planted to alfalfa has practically been deepened for subsequent sowing in wheat. We do not know of any observations having been made upon the root development of wheat in prairie soils, nor as to the depth to which they penetrate in the virgin soil, where there is a very fine, compact, and tough substratum, the result of settling and compacting of ages.

To plant such soil to alfalfa is to perforate this compact subsoil with numerous channels for the passage of water and air and for the entrance of other roots, when those of alfalfa have rotted. The work done by alfalfa roots in accomplishing this is very great, but this work is to benefit the soil, to the advantage of the succeeding crops and to the profit of the owner, being the cheapest labor as well as the best directed and most efficient of any which he can employ. The great benefit accruing to worn-out wheat fields by being sown to alfalfa is a matter assumed to be a fundamental fact of New Mexico farming.

At average prices alfalfa hay does not bear transportation, except it can be converted into some more marketable form; and this has been the case for years. Until recently the fattening of steers was profitable, and consequently a favorite manner of marketing alfalfa hay. The hay was fed in the field, the animals pasturing and feeding on the ground upon which the crops grew; this was practically equal to returning the crop to the soil from which it was taken. Of course, the practice is not without some drawbacks; still the crowns were not trampled to death and the voidings of the animals were equivalent to manuring the surface soil with the crop grown upon it. There is no question that this is not an economical way of treating the manure; but, in spite of the losses, a large amount of the manurial elements of the crop were returned to the soil.

This does not hold for sheep feeding, and unless farmers pay more attention to the manure of the sheepfold, some of the beneficent effects of alfalfa growing observed in the past will be wanting in the future. The care of this manure is an important question to the people of this country. Alfalfa is a heavy feeder and lays a tax upon the soil for every benefit it bestows. The apparently wasteful methods of the past have tended to gain all the advantages from growing this plant and to obviate any disadvantages. If the same good results are to be maintained under a changing system of feeding, care must be exercised, and the manurial equivalent of the crop must be returned to the soil.—[Field and Farm.]

OUR HOME MARKETS.

The manifold resources of New Mexico command notice from the home seeker and the immigrant, among other reasons, because it will be years before the Territory of New Mexico will produce sufficient to fill the demand of the home market. Pastoral and allied industries are inviting to the young farmer of the East who is seeking a broader field in which to toil, and where his remuneration will be more munificent than the Central and Eastern States allow.

The mineral wealth of the Territory and the surrounding States puts a higher premium on agriculture in New Mexico than is possible in Illinois, Indiana, or Ohio, for, while those States are fully equipped for horticulture and agricultural successes by excellence of soil and ample humidity, they are devoid of that large consuming element that produces no breadstuffs, yet delves into the earth and secures wealth which the producer of grains, fruits, and clothing needs as a reward for his effort. It is only in recent years that the manufacture of flour commenced in Colorado and has since partly supplied the demand in New Mexico. Previous to that time the supply was drawn from the East, 200 carloads coming to Las Vegas in a single year, and to other towns in like proportion. Every day in the year now trains roll into the Territory from the East, laden with the products of other States which can be made or grown within our Territory. There is an actual demand within the Territory for 20,000,000 pounds of flour annually. Over 8,000 tons of corn are used, and the same general facts are applicable to the other articles of domestic consumption. In every instance there is an actual home market for everything the farmer and fruit grower raises. It is waiting for the home seeker and immigrant to supply it from the soil of the Territory of New Mexico.

No one has taken the trouble to raise such articles in sufficient quantities in the past. But the era of advancement in this direction having set in, only needs to be pursued a few years, when the industry of California will be repeated, and New Mexico will be shipping fruit to Europe. Now is the time for a start for many a young farmer from the older sections of the Union which have failed to give reward for industry. If he will head for the valleys of New Mexico, where new districts are being put under irrigating canals by heavily capitalized companies, he will be convinced, after investigation, that a sure road to wealth, independence, and health will have been entered upon when he concludes to cast his fortune with the coming State of New Mexico.

THERMAL SPRINGS OF NEW MEXICO.

Excepting the famous Yellowstone National Park, situated in the northwest corner of Wyoming, there is no other locality outside the Territory of New Mexico that contains so many natural thermal springs. This fact is not generally known throughout the States, and I avail myself of the opportunity to say a few words about these health shrines of nature's own furnishing, so frequently sought by the unfortunate sufferer from disease. Many persons not informed upon the natural resources of their own country annually flock abroad to seek relief from the waters of the various European "spas." Many of these persons might be induced to visit the great natural springs so numerous in this Territory could the matter of their medicinal merit be brought to notice in such a way as to show them that what they seek abroad can readily be found at home, and that in curative properties the natural mineral springs of New Mexico excel many of those of European repute.

Accurate analyses made by competent chemists show the composition of most of the springs found in New Mexico to be superior in many respects to those enjoying the highest reputation in Europe and in other countries. Many of these places are far removed from the general line of travel, but those best known to-day are easily accessible to the tourist and health seeker, and are reached by good roads and stage lines. Many of them are equipped with modern hotels and bathrooms, good food, good service, healthful surroundings; in fact, ideal conditions to carry out a line of treatment where regularity, isolation, physical and mental rest are important factors. It would be a work of supererogation to attempt an enumeration of the many afflicted persons who have visited these springs, taking a course of the waters, and returning to their homes greatly benefited in health. A glance at the chemical composition of many of these waters will show that they compare favorably with many of those most sought in various parts of the world.

The geologic processes are so recent in New Mexico that nearly every county in the Territory has its healing, hot, or mineral springs. The purpose of this article is only to give a few facts concerning the more accessible resorts. Many important places are necessarily omitted, because the average tourist would be unable to visit them.

In geographical order the first to be mentioned are—

FOLSOM HOT SPRINGS.

Situated near Alps, a station on the Denver, Fort Worth and Texas Railroad, 59 miles south of Trinidad, on the summit of the Raton range of mountains, close to the extinct volcano of Capulin, in Colfax

County, near the northern boundary of the Territory. The altitude is about 6,500 feet, and the location is very beneficial for consumptives. They have fine medicinal properties and promise to become of prominence.

LAS VEGAS HOT SPRINGS.

In San Miguel County, at the mouth of the picturesque Gallinos Canyon, on the banks of the Gallison River, is situated the Las Vegas Hot Springs, famed throughout the length and breadth of the land for their curative virtues in a multitude of diseases.

The springs are twenty-two in number, and from analyses made by Prof. F. V. Hayden, of the United States Geographical Survey, the following is extracted:

Constituents.

	1.	2.	3.
Sodium carbonate ..... per cent..	1.72	1.1	5
Magnesium carbonate ..... do....	1.08	10.6	10.43
Sodium sulphate ..... do....	14.12	15.43	16.21
Sodium chloride ..... do....	27.26	24.37	27.34
Potassium ..... do....	Trace.	Trace.	Trace.
Lithium ..... do....	St. trace.	St. trace.	St. trace.
Silicic acid ..... do....	1.04	Trace.	2.51
Iodine ..... do....	Trace.	Trace.	Trace.
Bromine ..... do....	Trace.	Trace.	Trace.
Temperature ..... degrees F..	130	123	123

In its chemical composition this water resembles in many respects the waters of the famous hot springs of Teplitz, in Austria, while in its two chief active constituents, the carbonate and sulphate of sodium, it may recall the somewhat analogous, though very much stronger, waters of Carlsbad, justifying in a degree the name often given it of "dilute Carlsbad water." This dilution, however, is more frequently a benefit than a disadvantage, for it permits a larger amount of the water to be taken, thus securing the valuable solvent and eliminating powers of the water itself, together with the remedial virtues of its mineral constituents.

OJO CALIENTE (HOT SPRINGS).

These celebrated hot springs are located in the midst of the ancient Cliff Dwellers, 25 miles west of Taos and 50 miles north of Santa Fe, N. Mex., and about 12 miles from Barranca Station, on the Denver and Rio Grande Railway, from which point a daily line of stages run to the springs. The temperature of these waters is from 90° to 122° F. The gases are carbonic. Altitude, 6,000 feet; climate, very dry and delightful the year round. There is now a commodious hotel for the convenience of invalids and tourists, and the reputation of these wonderful medicinal waters is fast spreading. These waters contain 1,686.34 grains of alkaline salts to the gallon, being the richest alkaline hot springs in the world. An analysis of these waters shows a total of 288.09 parts in 100,000 divided as follows:

Sodium carbonate	196.95
Calcium carbonate	4.20
Iron carbonate	20.12
Sodium chloride	40.03
Arsenic	10.08
Lithium carbonate	1.22
Magnesium carbonate	6.10
Potassium sulphate	5.29
Silicic acid	4.10

JEMES HOT SPRINGS

Are in Bernalillo County, in Santiago Canyon, being a branch of the Jemes Creek, which 9 miles south connects with another branch running through Guadaloupe Canyon. To reach them one has to travel from Santa Fe by wagon road to Pena Blanca, 27 miles distant west, crossing the Rio Grande there, and thence keeping a western course through the foothills of the Valles Mountains to Jemes pueblo, 26 miles; from there it is 13 miles to the first group of springs, at Archuleta post-office; or from Bernalillo, on the Atchison, Topeka and Santa Fe Railroad; also by wagon road past Santa Ana and Zia (or Silla) pueblos to San Ysidro and thence to Jemes pueblo, where this road and the former join, distant 27 miles.

Both roads are sandy, but the latter especially so, running for about 13 miles through Jemes Canyon.

A much better road, running from Archuleta north and northeast through the mountains and ending at Espanola, has recently been constructed.

There are several groups of hot springs in Santiago Canyon, but those at Archuleta, and 2 miles farther north, are most frequented. At Archuleta are ample hotel accommodations. Many health seekers prefer the "upper group" and camp there. At both places the scenery is enchanting and the atmosphere dry and healthy.

The lower springs, at Archuleta post-office, have an altitude of 6,620 feet above sea level. Limestone and sandstone of the Carboniferous age form the sides of the canyon, 1,000 feet high, often changed from their original position by volcanic materials. There are here:

1. A geyser with an opening of 1 square foot, a temperature of 168° F., running about 50 gallons a minute, with escaping carbonic acid and deposits of white carbonate of lime.
2. A spring of 130° F. with free carbonic acid and red-brown deposits.
3. A spring of 119° F. with "alga" (cryptogamic water plants). A black sulphate of iron forms on them, a result of the action of sulphureted hydrogen upon carbonate of iron and oxide of iron in the alga. The sulphureted hydrogen is a product of the reduction of gypsum.

There are more springs, with a temperature from 102° to 108° F. The total salts in 100 parts of water amount to 0.2401 parts of sodium, lime, and magnesia. These springs are especially beneficial to rheumatic diseases.

The upper group, 2 miles from Archuleta, in the same canyon, consists of 42 springs. Their elevation is about 6,740 feet above sea level and their temperature varies from 70° to 105° F.

They flow from caves of carbonate of lime, some of which are 20 feet in height. Combined they form a dam or dike 30 feet high and 200 feet long. The springs contain 37.26 parts solids in 100 parts water, mostly chloride of sodium and sulphate and carbonate of soda, lime, and magnesia. They greatly resemble the famous Marienbad.

Besides the hot springs, north of the upper group are cold mineral springs. Halfway between the two groups is an extensive ruined pueblo.

CHERRYVILLE SPRINGS.

In Socorro County, at Cherryville, is the next occurrence of noted springs. These are found near the head of the cañada or falls of the

Alamosa, whence Geronimo started out on his famous raid. They are accessible by stage from Engle, a station on the Atchison, Topeka and Santa Fe Railroad. They are on the eastern slope of the Black Range. The temperature is 130° F. and the altitude 6,540 feet.

GILA HOT SPRINGS.

In the southwestern part of Socorro County, on the west of the Gila or Diamond Creek, as it is called, is a group of springs, at 5,545 feet altitude, that are easily reached by wagon from Silver City. The temperature is 130° F. and they carry similar ingredients to the Jemes Springs.

APACHE TAJOE SPRINGS.

Four miles from Whitewater, on the Atchison, Topeka and Santa Fe Railroad, are also found some good springs of 97° F. They are in Grant County, 30 miles north of Deming.

HUDSON SPRINGS.

Twenty-four miles north from Deming, and within 3 miles of Hudson, on the Santa Fe road, are several good springs. These springs are widely known and much frequented, both on account of their medicinal value and the lovely climate and beautiful scenery.

The average temperature of the springs is 130° F. and their altitude 5,782 feet above sea level. The main spring is a mound of soda, lime, and magnesia, in the center of which is a large depression containing the permanently boiling water which has effected many cures of rheumatism and kidney and blood diseases. The water contains in 1 gallon the following solids:

	Grains.
Silica	1.552
Alumina and oxide of iron	.530
Carbonate of lime	4.448
Carbonate of magnesia	2.624
Sulphate of soda and potassium	13.547
Chloride of soda	2.286
	24.987

Some other undeveloped springs are about 3 miles north of Hudson Hot Springs.

It remains to be said that close to the western boundary of the Territory are several other locations of hot springs, of which one is about 10 miles southwest of Zuni and one in the valley of the San Francisco River, the latter at an altitude of 5,630 feet above sea level and having an average temperature of 84° F., largely used by the Indians and the people of the vicinity, respectively.

AZTEC SPRINGS.

This is a cold-water spring situated 4 miles east of Santa Fe. From the surrounding hills and ridges a magnificent view is had of the country for many miles, including the city of Santa Fe, the valley of the Rio Santa Fe, and portions of the valley of the Rio Grande del Norte, together with the magnificent mountain ranges in different directions.

Col. D. L. Huntington, surgeon, U. S. A., and curator to the United States Medical Museum, says of this spring: "The water contains 18 grains to the gallon of solid material, and it resembles many of the

celebrated German springs, and would be found very useful in such diseases as catarrh of the bladder and all forms of dyspepsia and intestinal indigestion. The water is also useful as a gentle and constant tonic."

Analysis of this water made by F. W. Clark, chief chemist of the Smithsonian Institution, Washington, D. C., shows it to contain the following per 1,000 parts:

Silica	0.220
Carbonate of calcium	1.538
Magnesium	.605
Sodium chloride	.225

With enough carbonic-acid gas to retain the carbonates of calcium and magnesium in solution as bicarbonates.

Such healing waters, taken in connection with the pure, dry, and bracing climate of the mountains, should surely prove a boon to those affected with many forms of disease, and the attention of physicians throughout the country is invited to the many merits they possess in the treatment of numerous forms of disease.

CLIMATE.

Report of the New Mexico Climate and Crop Section.

The Territorial assembly of 1898 renewed the annual appropriation of $700 for the purpose of printing the data collected by the service. All other expenses of equipment, distribution, salaries, etc., are borne by the United States Weather Bureau.

During the year ending June 30, 1899, 8 stations were established and 5 discontinued. At the close of the year there were 41 stations reporting to the central office at Santa Fe, which included 2 military posts, 5 stations of the Southern Pacific Railway, and 34 volunteer observation stations. Every county in the Territory is represented in the reports of the section, excepting Taos and the new county of Otero. In the latter county stations have been equipped at both Alamogordo and Fresnal, but as yet neither is in active operation. During the year the section has received meteorological reports from Dr. William Curtiss Bailey, medical superintendent of the Montezuma Hotel at Las Vegas Hot Springs. Dr. Bailey equipped the station at private expense, and the regular and careful reports from this noted health resort prove a valuable addition to the service.

There have been printed and distributed during the year 10,000 weekly climate and crop bulletins, 6,000 monthly reports, and 800 annual summaries. The weekly bulletins, issued during the crop season, are widely copied by the press of the Territory and frequently by outside papers. Their distribution by this means is estimated to reach more than 20,000 readers weekly.

The central office is continually receiving applications for meteorological data from citizens of other sections who contemplate settling or sojourning in the Territory. The proposed establishment of sanitariums for the treatment of tuberculosis at Fort Stanton and Fort Bayard by the United States Marine-Hospital Service has set the seal of approval of the highest medical authorities on the superior climate of New Mexico.

Crop review, season of 1898.

The season opened with March having a normal precipitation, but slightly cooler than usual. The temperature, however, was quite steady, and favorable for farm work. In southern sections wheat was sown in the early part of the month, but in the north little work was done before the 15th. During the last week in southern localities apricots and peaches were somewhat injured by frost, but in the north, where little advance had been made, the fruit was uninjured. Stock came through the winter in good condition, and feed on the ranges started out well. Water for irrigation purposes was plentiful.

April was very favorable, being both warmer and wetter than usual. There was a slight frost on the 1st and 5th, but little damage resulted, as crops were not sufficiently advanced. In southern sections wheat had a good growth by the end of the month, corn planting was well begun, and fruit trees were in full bloom

over the Territory generally. Alfalfa and grass on the ranges were making excellent growth.

The month of May was dry and cool. A frost on the 5th and 20th, in upper central sections, nipped tender garden plants and unprotected vineyards, and a killing frost on the 21st destroyed much of the fruit of San Juan County and vicinity. The drought caused little harm, as irrigation water was abundant; but the low temperature and absence of moisture retarded the growth of vegetation. During the last of the month corn planting generally was suspended, awaiting rains. In southern sections sugar-beet planting was carried on during the month under favorable conditions. The first cutting of alfalfa was made on the 15th in southern counties. Toward the close of the month stockmen were experiencing some difficulty in finding water for their stock, and ranges were beginning to suffer.

Although June averaged cooler than usual, the last ten days of the month were much warmer than normal. The protracted drought was generally broken, beginning with the 5th, and the month thereafter proved unusually favorable for stock and farming interests. Corn planting, which had been suspended, was resumed during the second week under most favorable conditions. Oats, wheat, and barley made very good growth, and the hot, sunshiny weather of the last ten days ripened grains so rapidly that by the close of the month some in the southern section had begun to harvest. Fruits also matured rapidly, and during the last week of June large consignments of plums, peaches, and cherries were being shipped from southern orchards. The effects of the May frosts became more apparent on fruits of northern sections, and it was expected that the total output would be greatly reduced.

The average precipitation for July was about an inch and a half greater than the usual amount, so that although the temperature was slightly below the normal the month as a whole was unusually favorable to crop growth. During the first week harvesting wheat and oats was well begun, but owing to showery weather some trouble was experienced in properly securing the crop. In northern counties the second cutting of alfalfa was well begun by the 15th, but much of this also was damaged by the rains. Corn made excellent growth during this wet season, and by the close of the month had more than made up for its late start. All garden truck, such as beans, peas, early potatoes, etc., were abundant in southern markets by the 15th. The marked feature of the month was the period of heavy showers during the second week, which caused "washing" of standing grain, and interfered greatly with harvest. In many localities it was impossible to secure the grain which had been cut, and much of it was expected to sprout in shock. The damage was not so great as was anticipated, however, as the dryer weather of the latter part of the month brought more favorable conditions, and permitted many farmers to clean up their harvesting to good advantage. In the northern section, however, much of the grain and of the second crop of alfalfa still remained uncut. Fruits were turning out very satisfactorily. At the close of the month early grapes were ripe in some localities, and melons were being shipped from southern fields. In northern counties the larger tree fruits were coming to market. Sugar beets continued very promising. The weather during this period was particularly favorable to stock interests, there being sufficient water and excellent feed.

The average temperature for August was about 2.5° below the normal. The rainfall also was a quarter of an inch below the usual amount, and occurred as light showers rather well distributed over the Territory and during the month. Toward the close of the month, however, southern districts suffered considerably from drought. Wheat, barley, and oats harvests in southern sections were well secured by the 10th. As a rule corn continued doing well, but toward the close of the month suffered somewhat from lack of rain in nonirrigated fields. By the close of the second decade early fruits of all kinds, melons, and early varieties of grapes were abundant in southern markets, and also were in northern markets by the end of the month. Sugar beets in general continued particularly promising, although during the latter part of the month some fields suffered considerably from drought. At this time fears were entertained that there would be a scarcity of winter feed on northern ranges. With few exceptions there was sufficient water throughout the month for irrigation purposes.

September was an unusually dry and sunshiny month. The greater part of the month was much warmer than usual, although the average temperature for the whole month was about 1° below the normal. This average deficiency was caused by the cold spell from the 9th to the 13th, when the first killing frost occurred throughout northern portions, causing much damage to potatoes, tomatoes, melons, etc., and also injuring alfalfa and unripe corn. The average precipitation was a little less than three-quarters of an inch, being about an inch below the aver-

age amount for this month. Nearly all of this rain fell during the cold snap, the first week and the period after the 13th being dry, and with cloudless skies. The third cutting of alfalfa was secured during the first week in southern counties, and in northern sections during the third. In northern counties corn cutting was in progress during the third decade, and in some localities ground was being prepared for fall planting. Notwithstanding the frosts, garden vegetables continued in abundance. Sugar beets were maturing very satisfactorily, the crop promising to be the finest yet grown. The larger tree fruits, as apples, pears, peaches, nectarines, etc., matured very satisfactorily, and in most sections were unusually fine although the yield was somewhat less than usual. Grapes also were reported as being of an unusually fine quality, although the yield was below that of some former years. As a rule the feed on ranges held out very well, and stock continued in prime condition, but the protacted drought caused some anxiety as to the prospects for winter feed, especially among northern stockmen. Water for irrigation purposes, with the exception of a few isolated cases, continued sufficient notwithstanding the drought during September, and the season of 1898 closed as one of the most prosperous New Mexico has known.

Climatological data for the year 1898.

Stations.	Counties.	Elevation (feet).	Temperature, in degrees Fahrenheit.						Precipitation in inches.							Number of rainy days.	Sky.			Prevailing direction of wind.
			Length of record (years).	Annual mean.	Highest.	Date.	Lowest.	Date.	Length of record (years).	Total for the year.	Greatest monthly.	Month.	Least monthly.	Month.	Total snowfall.		Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	
Albert	Union	4,700	7	56.1	106	June 25	4	Dec. 9	7	14.51	4.52	July..	0	Feb ..	12.7	47	225	102	38	.....
Albuquerque	Bernalillo..	5,008	22	55.5	104	June 29	0	Jan. 25	23	6.39	1.25	July..	.12	May ..	22.4	39	.....	.....	.....	S.
Alma	Socorro	5,500	.....	54.2	100	July 28	— 5	Jan. 24*a*	.....	17.26	4.00	July..	0	Oct...	.....	.....	.....	.....	.....	SW.
Aztec	San Juan ..	5,590	.....	48.4	99	July 29	—16	Jan. 25*b*	.....	10.16	2.47	July..	0	Oct...	28.5	52	.....	.....	.....	W.
Bernalillo	Bernalillo..	5,260	.....	55.7	99	June 26*c*	3	Dec. 14	.....	5.82	1.38	Aug ..	T.	Sept..	13.7	32	315	44	6	E.
Bluewater	Valencia	6,200	.....	47.8	100	July 1	— 8	Jan. 25	.....	8.07	3.72	July..	0	(*d*)	13.0	24	.....	.....	.....	W.
Buckman's	Rio Arriba.	8,500	.....	38.3	92	June 29	—30	Dec. 22	.....	14.51	4.12	July..	.12	Sept..	62.0	76	195	151	19	W.
Clayton	Union	5,178	.....	54.0	100	July 28	— 1	Dec. 8	.....	14.05	3.15	June .	T.	Mar ..	22.3	.....	.....	.....	.....	S.
East Las Vegas	San Miguel.	6,450	11	49.3	92	June 29	— 6	Jan. 22	11	16.99	4.63	July..	.21	Feb ..	25.7	78	237	52	26	SW.
Eddy	Eddy	3,122	5	59.8	101	June 2	10	Dec. 9	5	16.92	5.51	June .	0	Oct...	6.5	41	211	65	89	SE.
Engle	Sierra	4,750	.....	55.0	101	July 29	4	Dec. 13	.....	14.38	4.40	Aug ..	0	(*e*)	17.0	25	198	146	21	SW.
Espanola	Santa Fe...	5,590	.....	50.0	100	June 29	—15	Jan. 25	.....	7.78	2.22	July..	0	Feb ..	15.5	36	261	97	7	S.
Folsom	Union	6,000	.....	48.3	92	June 29*f*	8	Jan. 24*g*	.....	17.85	3.48	July..	.12	Mar ..	80.1	63	188	153	24	SW.
Fort Bayard	Grant	6,040	23	54.2	96	July 28	— 1	Jan. 25	23	16.21	6.56	July..	0	(*h*)	19.0	52	.....	.....	.....	SW.
Fort Union	San Miguel.	6,750	38	48.5	99	June 29	— 2	Dec. 23*i*	38	20.19	5.74	July..	.02	Mar ..	21.7	54	.....	.....	.....	SW.
Fort Wingate	Bernalillo..	6,649	35	50.4	100	June 30	—10	Jan. 25	35	13.62	3.83	July..	0	Oct...	47.3	.....	.....	.....	.....	W.
Galisteo	Santa Fe...	6,074	.....	51.6	98	July 19	1	Dec. 31	.....	9.30	3.41	July..	0	(*j*)	19.5	.....	.....	.....	.....	W.
Gallinas Spring	San Miguel.	5,272	13	54.0	101	June 29	0	Jan. 22	13	12.13	4.00	July..	T.	Oct...	18.0	48	219	72	74	W.
Gila	Grant	4,040	.....	58.7	106	July 28	0	Dec. 13	.....	15.22	3.18	July..	T.	Oct...	13.5	61	240	85	40	SW.
Hillsboro	Sierra	5,100	.....	.....	104	June 24	9	Jan. 22	6	10.54	3.31	July..	0	Oct...	13.5	.....	.....	.....	.....	W.
La Luz	Donna Ana	4,750	.....	58.8	96	June 16*k*	14	Dec. 10	.....	19.23	6.30	July..	T.	(*l*)	5.6	52	216	137	12	SW.
Las Vegas Hot Springs	San Miguel.	6,767	.....	.....	98	June 28	0	Dec. 10*m*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	SSW.
Los Lunas	Valencia ...	4,900	6	.....	.....	.....	—10	Jan. 22	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lower Peñasco	Lincoln	5,250	.....	55.1	99	June 26	3	Dec. 9	.....	20.35	7.40	July..	T.	Oct...	22.6	47	.....	.....	.....	W.
Mesilla Park (formerly Las Cruces).	Donna Ana	3,500	11	57.2	102	July 29	7	Jan. 17*n*	11	11.21	2.43	Aug ..	T.	(*o*)	.....	50	191	108	66	W.
Monero	Rio Arriba.	7,356	8	.....	.....	.....	—20	Jan. 25*p*	6	.....	4.49	July..	.11	Aug ..	27.0	.....	.....	.....	.....	W.
Puerto de Luna	Guadalupe.	5,350	6	56.8	102	July 27	4	Dec. 31	6	13.98	5.51	July..	0	Feb ..	19.0	.....	.....	.....	.....	W.
Raton	Colfax	6,400	.....	48.5	98	Aug. 15	— 8	Dec. 12	.....	13.97	4.00	July..	0	Mar ..	15.7	.....	.....	.....	.....	S.
Rincon	Donna Ana	4,030	.....	59.1	102	July 29	10	Dec. 31	.....	11.13	3.62	July..	0	Feb ..	.....	20	284	39	42	W.
Roswell	Chaves.....	3,570	6	57.2	100	July 23	2	Jan. 20	6	20.62	6.53	July..	T.	(*r*)	17.0	43	189	107	69	SW.
San Marcial	Socorro	4,554	.....	.....	100	June 4	2	Dec. 12*s*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S.
Santa Fe	Santa Fe...	6,998	24	47.9	91	June 29	— 6	Jan. 25	24	12.97	4.00	Aug ..	.18	Sept..	21.9	73	201	103	61	SE.
Shattuck's	Eddy	6,000	.....	.....	100	May 25*t*	— 2	Dec. 8*v*	.....	.....	.....	.....	.....	.....	38.5	.....	.....	.....	.....	SW.
Socorro	Socorro	4,600	7	.....	.....	.....	4	Jan. 24*w*	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	NW.
White Oaks	Lincoln	6,470	.....	51.2	95	June 26*x*	— 3	Jan. 16	.....	22.47	5.60	July..	0	May ..	31.5	59	261	50	54	W.
Winsors	San Miguel.	8,000	.....	40.6	86	June 28*y*	—14	Jan. 15	.....	23.19	5.10	July..	.71	Mar ..	.....	.....	.....	.....	.....	W.S.

a And Dec. 13. *b* And Dec. 31. *c* And June 29. *d* Mar., Sept., and Oct. *e* Feb. and Oct. *f* And June 30 and July 27. *g* And Jan. 25, 26, and Dec. 31. *h* Feb., May, Oct.
i And Dec. 30. *j* Mar., May, Oct. *k* And June 25. *l* May and Oct. *m* And Dec. 31. *n* And Jan. 22. *o* May and Oct. *p* And Jan. 26 and Dec. 30.
r Mar. and Oct. *s* And Dec. 14. *t* And July 27. *v* And Dec. 9 and 28. *w* And Dec. 14. *x* And July 28. *y* And June 29 and July 28, 29.

Voluntary observers.

Stations.	Observers.	Stations.	Observers.
Albert	A. Knell.	La Luz	Mrs. H. T. Findley.
Albuquerque	Prof. M. Custers.	Las Vegas Hot Springs.	Wm. C. Bailey, M. D.
Alma	Wm. French.	Lordsburg	Agt. So. P. R. R. Co.
Aztec *a*	Dr. T. J. West.	Los Lunas	Richard Pohl.
Bernalillo	Bro. Gabriel.	Lower Penasco	J. F. Hinkle.
Bluewater	J. S. Van Doren.	Mesilla Park	New Mexico Agr. College.
Buckman's	H. S. Buckman.	Monero *c*	D. W. Caldwell.
Clayton	G. W. Guyer.	Olio	Cyril James Collyer.
Deming	Agt. So. P. R. R. Co.	Puerto de Luna	P. R. Page.
East Las Vegas *b*	Dr. F. H. Atkins.	Raton	W. M. Oliver.
Eddy	Prof. E. M. Skeats.	Rincon	A. J. Coats.
Engle	E. J. Westervelt.	Roswell	W. M. Reed.
Espanola	Jim Curry.	San Marcial	J. W. McCoach.
Folsom	Jackson Tabor.	Santa Fe	U. S. Weather Bureau.
Fort Bayard	Post Surgeon.	Shattuck's	J. S. Shattuck.
Fort Union	M. C. Needham.	Socorro *d*	Prof. W. H. Seamon.
Fort Wingate	Post Surgeon.	Springer	Dr. L. Hines.
Galisteo	Sylvester Davis.	White Oaks	Urbain Ozanne.
Gallinas Spring	Jas. E. Whitmore.	Winsors	H. D. Winsor.
Gila	Chas. H. Lyons.		
Hillsboro	Frank I. Given, M. D.		

Forecast display stations—Distributing center, Santa Fe.

Stations.	Displaymen.	Stations.	Displaymen.
Albuquerque	Postmaster.	Raton	A. L. Hobbs.
Clayton	G. W. Guyer.	Roswell	W. M. Reed.
Eddy	P. V. & N. E. Ry.	Silver City	Prof. A. E. Bennett.
Las Vegas	City Marshal.		

Climate and crop correspondents.

Stations.	Correspondents.	Stations.	Correspondents.
Alameda	Arthur Betts.	Las Cruces	C. Thompson.
Albert	H. M. Hansom.	Los Alamos	Wm. Frank.
Albuquerque	M. Custers.	Los Lunas	Richard Pohl.
Allison	Wm. Taylor.	Lower Gila	J. E. Casper.
Alma	Wm. French.	Lower Penasco	J. F. Hinkle.
Aztec	Prof. C. E. Mead.	Mangus	Thos. J. Clark.
Bernalillo	Brother Gabriel.	Manzano	J. F. Chaves.
Bluewater	J. S. Van Doren.	Ocate	E. M. Cosner.
Buckman's	H. S. Buckman.	Ojo Caliente	A. Joseph.
Clayton	G. W. Guyer.	Old Albuquerque	A. Montoya, jr.
Eddy	L. O. Fullen.	Olio	C. J. Collyer.
Eddy	A. L. Hilton.	Puerto de Luna	P. R. Page.
Engle	E. J. Westervelt.	Raton	W. M. Oliver.
Espanola	Jim Curry.	Rincon	C. H. Raitt.
Estalina Springs	E. A. Clemens.	Roswell	W. M. Reed.
Farmington	J. G. Willett.	Santa Fe	A. Boyle.
Fort Union	M. C. Needham.	Shattuck's	J. S. Shattuck.
Frisco	C. Hightower.	Silver City	D. C. Hobart.
Galisteo	Sylvester Davis.	Socorro	Prof. W. H. Seamon.
Gallinas Spring	J. E. Whitmore.	Springer	Dr. L. Hines.
Gila	Chas. H. Lyons.	Tularosa	J. H. Lightfoot.
Hillsboro	R. A. Nickle.	Valley Ranch	H. M. Strong.
La Belle	Frank Staplin.	White Oaks	Urbain Ozanne.
Las Vegas	F. O. Kihlberg.	Winsors	H. D. Winsor.

a Prof. C. E. Mead, from July.
b Miss Inez D. Rice, from October.
c Mrs. C. D. Caldwell, from August.
d Prof. F. A. Jones, from September.
Forecasts are bulletined at all stations along the Pecos Valley and Northeastern Railroad.

Annual summary of meteorological data Santa Fe, N. Mex., 1898.

Month.	Pressure.			Moisture. a				Cloudiness, 0 to 10.	Wind.				Percentage of sunshine.
	Monthly mean.	Extremes.		Dew-point.		Relative humidity.		Average daily	Average hourly velocity.	Maximum velocity.	Direction at time of maximum velocity.	Prevailing direction.	
		Maximum.	Minimum.	6 a. m.	6 p. m.	6 a. m.	6 p. m.						
January	23.17	23.55	23.73	11	9	67	45	4.5	5.8	27	SW.	NE.	55
February	23.27	23.51	22.97	17	22	63	43	2.8	5.4	28	N.	NE.	83
March	23.15	23.38	22.88	15	9	56	29	3.3	7.1	36	SW.	SW.	74
April	23.27	23.50	22.89	23	17	51	30	4.1	8.1	36	SW.	SE.	71
May	23.21	23.48	22.99	25	16	47	20	4.2	8.3	38	SW.	SW.	79
June	23.32	23.50	23.16	37	27	52	28	4.1	6.1	30	SE.	SW.	70
July	23.39	23.55	23.26	48	44	67	43	6.3	5.7	34	NE.	SE.	61
August	23.39	23.54	23.21	46	43	66	38	4.5	5.8	25	S.	SE.	72
September	23.34	23.57	23.17	28	21	46	19	2.1	5.4	30	S.	SE.	90
October	23.34	23.59	23	18	9	44	16	2	6.1	30	NE.	SE.	89
November	23.22	23.48	22.79	15	13	54	35	2.1	6.6	41	SW.	SE.	82
December	23.26	23.52	22.98	10	10	69	50	3	7	36	NE.	NE.	74
Total for year	23.28	23.59	22.73	24	20	57	33	3.6	6.4	41	SW.	SE.	75

a Mountain time.

CLIMATIC CONDITIONS.

There is no portion of the Union possessing such splendid climatic conditions as exist in this Territory. Here we have a dry, arid temperature, with no extremes of heat or cold, with clear, bright skies and an almost continuous sunshine, that has given New Mexico the well-known sobriquet of "the Sunshine State."

The climate is peculiarly adapted to the cure of pulmonary diseases. A celebrated physician who has given much study to the subject, and who recently made a tour of Europe and America in the interest of this class of the afflicted, investigating the climatic conditions of the various countries with reference thereto, recently stated that the conditions existing in New Mexico were superior to those found elsewhere; that it was an ideal climate for the cure of pulmonary diseases. This is conceded by the best-informed medical experts.

It is probable that at this time there is no disease that afflicts so large a class of humanity with such fatal results as that of pulmonary consumption; none that causes so much suffering, pain, and sorrow. It is a scourge affecting every class, the rich and the poor, the high and the low—all fall beneath its blight and succumb to its dreadful ravages.

Medicinal science has never been able to master it, or to discover medical appliances or remedies that will cure it when once it has a firm hold upon its victim. The greatest minds of the profession have devoted their lives to its study, searching for remedies without avail. All agree that nature's remedy is the best and only cure. Breathing of a pure, invigorating, rarefied atmosphere in an equable climate, with clear, bright sunshine, where the heat of the sun is at its maximum and that of the air at its minimum, are the best conditions for its cure.

All of these conditions are found at their best in New Mexico. In

every community may be encountered those who have taken advantage of these life-giving qualities. In a large majority of cases where the invalid has come in the early stages of the disease he has found relief and either been entirely cured or had many years added to his life.

OUR MATCHLESS CLIMATE—PEERLESS AMONG PLACES, NEW MEXICO'S CLIMATE MAKES OF MERE LIVING A LUXURY.

Such are the general features of the climate of New Mexico, diversified, of course, by the peculiarities of each particular place as to whether in the northern, central, or southern part of the Territory; whether in river valley, on low-lying table-land, on higher mesa, or on mountain side; whether in sandy sections, on clayey soils, or in the rude wilderness of rock and gravel; whether surrounded by primeval pine forests, dry stretches of barren prairies, cultivated fields of grains and grasses, luxuriant orchards and gardens and vineyards; whether with eastern, western, northern, or southern exposure—in fact, the modifications are so innumerable in themselves and in their combinations that no two places, even a few miles removed, can be said to have identically the same climate. And yet the same general features pertain to all: Mild winters, cool summers, nights never warm, ceaseless sunshine, dry air, little rain, great altitude, no malaria, and abundance of electricity, making the matchless climate of the world. It is not given to the earth to claim perfection, but New Mexico comes as near perfection in climate as the world can produce. The mere act of living here is in itself an indescribable luxury. The drinking in of its pure, dry, electrified air is like taking an elixir. The walking on its elevated soil, where 7,000 pounds of air pressure have been removed from the ordinary human body, is like treading a new world. To gaze into the vast serenity of its dazzling blue sky, unflecked by cloud, undimmed by storm, is a pleasure never to be forgotten and never growing stale by repetition. To look out over its landscapes, with their sharply contrasted high lights and deep shadows, as of a scene illuminated by electricity, makes other views grow tame upon the eye. In summer, to arise every morning invigorated from a refreshing sleep between blankets, and to retire again in the evening without the lassitude and abject weariness produced by having spent the day in a sweltering sweatbox; in winter, to know nothing of the piercing, prying, not to be excluded cold, gnawing its way to your very marrow and curdling as it were the actual blood in your veins—to escape these, and have a winter with but few days when an overcoat is needed by anyone attending to business, and with almost every day permitting invalids to enjoy the sunshine and fresh air by walking, driving, or sitting in the parks, and, on the other hand, to find in summer that fans are never required for comfort, and that as soon as the sun goes down from the mountain heights and the lofty valleys there come sweeping upon the lower lands, cool and invigorating breezes, laden with resinous aroma and surcharged with electricity, carrying health to diseased lungs and throats, strengthening the entire frame, building up the physical man, invigorating depleted brain tissue, restoring destroyed appetite, quieting excited nerves—in a word, turning back the hands of life on the dial of age—to experience these things is to fall in love with the land and to be unwilling ever again to live elsewhere.

TO THE HEALTH SEEKER—EXCEPT WHERE ALTITUDE IS HARMFUL NEW MEXICO INVITES THE AFFLICTED OF THE EARTH.

While every class of invalid, except those suffering from heart trouble, will find relief in the climate and medicinal waters of New Mexico; while miasma is unknown and malaria can not be produced for lack of decaying organisms; while the water is pure and wholesome and the air is tonic in cases of feebleness and debility; while stomach and bowel troubles are unknown among infants and children are remarkably free from the insidious ills that wait on childhood; while rheumatism and skin and blood diseases vanish before the application of New Mexico's thermal waters; while all these and many others may be beneficiaries of the Territory's matchless climate, it is to the consumptive that this "land of sunshine" is emphatically the land of hope and health. The abundant electricity produces an unusual quantity of ozone from the oxygen of the atmosphere, and the pure, dry air, the ozone, and the balsamic exhalations rolling down from the pine-clad mountains, form an ideal natural medicament for all diseased air passages and mucous membranes, and they, in connection with the altitude, requiring greater lung activity, and the ceaseless sunshine, vitalizing every func-

tion of the human frame, will invariably cure consumption if it be taken in time, and if the health seeker avail himself of nature's remedies by a life of outdoor exercise.

There are more men in New Mexico who have recovered from consumption after having been given over by their doctors in the States than are to be found in all the rest of the country put together. They came here, they recovered, and they are now among the leading men of the Territory. Consumption among the natives is absolutely unknown, and the children of consumptive parents coming here from the East grow up without the taint.

NEW MEXICO THE WORLD'S GREATEST CLIMATIC RESORT FOR THE CURE OF CONSUMPTION, THROAT, AND LUNG DISEASES.

Consumption is the scourge of humanity, one death in every six being placed to its charge. When it is remembered what a mighty army of diseases death marshals against the race, and yet that a sixth of the slain is from this one disease, the fearfulness of its curse becomes appalling. It shows that for other diseases science has found remedies, but that against consumption all knowledge and efforts are helpless. Hereditary and contagious, and often originating apparently without either cause; sometimes skipping a generation or certain members of a family, but ever returning for a prey to their descendants; as the race increases and as the appliances of civilization are augmented, cutting wider swaths in the field of human life, and yet laughing to scorn all medical skill and proving obdurate alike to the discovery of the scientists and the nostrum of the charlatan—such is consumption, the invincible lieutenant of death.

STUDY OF STATISTICS.

For some time the gathering of statistics had shown that consumption is much more prevalent in certain sections of country than in others. For instance, the proportion has been stated as Maine 50, remainder of New England States 25, Minnesota 14, Southern States 6, New Mexico 3, the last being less than anywhere else in the United States. But the further study of statistics brought to light the fact that, taking the world over, the greater or less prevalence of consumption accompanied certain marked differences in climate; and soon the climates of greatest and least prevalence became accurately defined. From this it was but a single step to the conclusion that those climates in which consumption least prevailed, or, in other words, which most largely prevented the disease, would be the climates most conducive to recovery from it. This conclusion was the more readily reached because medical science, despairing of materia medica, had been for some time empirically experimenting in the matter of climatic cure.

CLIMATE THE ONLY CURE.

The study of statistics brought to light the fact that those sections were the least affected with consumption which combined the most thoroughly in their climates aridity, altitude, sunshine, scanty vegetation, and absence of extremes in either heat or cold. This much being established, in 1885 the medical congress of France appointed a committee to make a thorough examination in any part of the world that gave promise of the requisite climatic conditions in any considerable degree. It was agreed that the greatest equability was to be found in the valleys of a mountainous country, where of necessity there would be comparative immunity from the winds and storms which sweep over the plains and coast regions. The committee agreed that the proper temperature would be found between the thirty-second and thirty-sixth degrees of latitude, where the patient would not be exposed to the severe weather of the north or the enervating influences of the south. The altitude necessary to give the best degree of atmospheric pressure was held to be about 5,000 feet above sea level, as less altitude gives too much pressure and hastens the destruction of lung tissue, while a higher altitude subjects the patient to the danger of other complaints.

This committee visited Asia, Africa, and North and South America, and agreed that the Rio Grande Valley of central New Mexico was the locality wherein the necessary conditions were found in the highest degree. But one locality—a small

territory in the northern part of Africa—compared favorably with it. The American Health Resort Association, in the year 1891, formally decided upon central New Mexico as the most suitable place in the world, and indorsed the report of the French physicians who had investigated the subject.

So much for theory. Now for experience, for when experience—the same, practically, as experiment—confirms theory or hypothesis, demonstration is regarded as established. Doubtless there is still a great deal to learn, but this much may be accepted as definitely determined:

First. That the bacilli of consumption will not develop at a greater altitude than 4,500 feet in combination with a dry atmosphere and abundance of sunshine. The development of the bacilli begun elsewhere will be arrested, and the progress of the disease be checked in all cases where not more than 10 per cent of the lung surface has been affected. Relief has been experienced and practical cures have been wrought where much greater proportions of the lungs have been attacked, but 10 per cent is believed to be the line of comparative safety.

Experience has also demonstrated that dampness of atmosphere furnishes a stimulus to the development of consumption, producing bacilli equaled by no other agency and approached in efficiency only by confinement within doors, cut off from exercise and direct sunshine, and accompanied by the customary inhalation of the superheated and vitiated atmosphere of a sick room. No wonder it is, where the dampness prevails for six months of the year and the other condition is necessitated during the remaining six to protect the invalid from the rigorous cold his weakened vitality is unable to resist, that in such localities consumption runs riot, and to be affected is to die. Yet such conditions prevail over large portions of the habitable globe.

Experience has further demonstrated that, while the most favorable points near the coast are loaded with moisture, this Territory furnishes a dry, germless, healing atmosphere, noted for rarity, aridity, purity, and abundance of ozone and electricity, with the added excellence of practically perpetual sunshine, and seasons destitute of excessive heat or rigorous cold. Thus is met the entire demand for dryness, evenness of temperature, elevation, sunshine, and tonic atmospheric effects—the five prime attributes in the conflict with consumption, nowhere else found combined in such fullness and perfection as in the climate of New Mexico. As incidentally illustrating this claim, it may be said that fresh meat is so perfectly cured by hanging in the open air it may be preserved for use indefinitely. Water will remain for months in basins formed by rocks in the mountains without stagnating or becoming impure. A dead animal may lie for months slowly drying and crumbling away, but giving forth no offensive odor.

But investigation has further brought to light the fact that while for ages prior to the conquest of Mexico consumption prevailed exclusively among the Spaniards, and is equally prevalent to-day, yet for centuries the New Mexico Spanish-Americans have been absolutely free from the disease, and the very name of it has long since passed from their vocabulary. Although many consumptives have made their home in this Territory, none of the natives have been known to contract the disease. Also the native born, whether Spanish or of other extraction, possess an absolute immunity, and this seems to apply even to those whose parents are consumptive.

The bearing of this fact is altogether important. If the death rate from consumption in New England is eight and one-third times that of New Mexico, and if the native born, regardless of national descent, have furnished not a unit to the ratio, then must the deaths have been

of those seeking this climate for recovery, and they should be credited to the sections whence they came, leaving New Mexico represented by zero in the list. Of course not all who come can be expected to recover. In many instances the patient can not be induced to make the change during the early stages, but, with the fallacious hopefulness characteristic of the disease, resists warning and advice until destruction of the lung tissue is so extensive as to be beyond repair even under the best climatic conditions and treatment. The necessity of being out of doors and active in order to reap the benefits which the climate offers is the testimony of all.

But another fact in this connection has been established, and it is worthy of all consideration. It was presented by Dr. William D. Barton, passed assistant surgeon, United States Marine-Hospital Service, in the North Carolina Medical Journal, January, 1896. After having laid down the proposition that the proper climate for curable or arrestable consumption is now almost as clearly defined as the value of vaccination and the relation of microorganisms to disease, and after clearly stating that in his belief the central portion of New Mexico is the preeminently favored region of the arid West, the most nearly ideal section for climatic treatment of lung troubles accessible to the people of the United States, he says:

Practically, tubercle germs do not infect here. Children of consumptives grow up heartily. The germs fall on barren ground and do not multiply. Without reckless disregard of all hygienic and preventive measures, this state of things will continue for many years or forever. These arid regions are nature's sanitarium for tuberculosis.

The following extract is from a very interesting paper by Dr. J. L. C. Whitcomb, of Liberty, N. Y. This paper was published in the New York Medical Record of September 25, 1898: "The one point I wish to emphasize with all the force I am capable of—the point, the importance of which overshadows and minimizes every other consideration in the treatment of this subject—is that suitable climatic environments are the absolute requisite of any successful treatment of phthisis, so far as medical knowledge can affirm at the present time. Of no other disease can this be said. In a nutshell, our one rational treatment is: First, early diagnosis; second, a suitable climate. Give the patient the benefit of these, and we give him nine chances to get well to one against it. * * * What is needed is oxygen—the oxygen of pure, dry air. This alone is a specific in early phthisis. It will not cure every case—no specific does that—but it will cure nine in every ten, providing enough of the remedy is taken."

One of the most important medical gatherings of recent times was held at Moscow, Russia. The occasion was the meeting of the International Medical Congress. It brought together more than 7,000 medical men, among whom were the recognized leaders of every civilized country. One meeting was devoted to the discussion of the present methods of treating tuberculosis. The quotations given below are from papers read by some of these great men.

By Dr. Von Ziemssen, of Vienna: "As far back as we can see in the history of medicine, fresh air has been one of the requirements in the treatment of tuberculosis, but it is only of late that the advantage of high altitudes has been clearly demonstrated. That tubercular patients can get a quantity of fresh air in these regions is evident to anyone who has visited the places; * * * but the fresh air that surrounds them is not all—the altitude brings about an excitation of the blood-making organs that increases the corpuscular elements in the blood. Even in health this reaction takes place, but not so markedly as in the diseased states."

By Dr. Senator, of Berlin: "I am convinced that the only treatment of value is the climatic, and I believe high altitudes are of value. I regard altitude as a factor second only in importance to fresh air. Sunlight is also of great value, and the sun's rays themselves exert a particular influence."

By Dr. Von Leyden, of Berlin, Germany, greatest general practitioner: "We must not look to the future; we are living in the present and must treat in the present. So far the only treatment that has given any success is the climatic. My best results have been obtainad in mountains. The more comfortable a patient be made there the better, as a rule, will be the results."

By Dr. Kornig, court physician of St. Petersburg: "I have found an increase in the red blood cells in patients who have gone to high altitudes, and I am inclined to attribute to this increase a large part of the benefit derived from mountain sanatoria."

By Dr. Jarvein, professor in the Military Academy of St. Petersburg: "After listening to the greatest authorities in Europe on the treatment of phthisis in mountain sanatoria I believe there can be but little doubt in the minds of those present that this is at present the only mode of treatment."

By Dr. Vivant, of Monte Carlo, Riviera, France: "The climate must be justly regarded as of value in the treatment of this disease (tuberculosis), and offers a certain number of features in common, viz: Pure air—that is, oxygen—in an unlimited quantity; and dryness—that is, absence of fogs, of air charged with moisture, to interrupt light, heat, and chemical action of the sun's rays."

ESPECIALLY NEW MEXICO.

Dr. George Halley, professor of surgery, Kansas City Medical College, says: "New Mexico possesses the seven great requisites of a sanatorium for the treatment of consumptive patients and those suffering from bronchial and certain forms of throat affections. First, a very dry aseptic air, experiment showing that the atmosphere is as free from harmful bacteria as that of midocean—the purest known to science. Second, a light atmospheric pressure caused by the high altitude of the country, and ample table-lands where the air has free movement and the rays of the sun uninterrupted play. Third, a maximum of sunshine and minimum of cloud. Fourth, a slight variation of temperature only between the extremes of heat and cold. Fifth, a minimum likelihood of sudden changes of temperature. Sixth, a light, porus, dry soil. Seventh (and very important), a low dew-point. I have sent many patients there, and the result has always been beneficial.

"It seems, at first sight, a long distance for patients to travel from France to New Mexico; but there is, I believe, no climate in southern Europe or northern Africa—the localities hitherto utilized for this purpose by Europeans—that can compare for a moment with that of New Mexico and parts of Colorado, for the treatment of consumption."

Speaking of the immunity of New Mexico from consumption, ex-Surgeon-General W. A. Hammond, United States Army, says: "New Mexico is by far the most favorable residence in the United States for those predisposed or affected with phthisis (consumption). In a service of three years in New Mexico, during which period I served at eight different stations, I saw but three cases of phthisis, and these were in persons recently arrived from elsewhere."

Dr. O. D. Walker, professor of physiology and diseases of the nervous system in the Keokuk Medical College, Keokuk, Iowa, and formerly physician in charge at the Government Indian school, Lawrence, Kans., makes the following interesting and valuable report of his observations in New Nexico: "I have carefully observed the salutary effects of this climate upon patients. A young lady, age about 18, came to me July 1, 1896, suffering from incipient phthisis. She was having night sweats, losing flesh, looked pale, and suffered from a very distressing cough. The microscope showed an abundance of tubercle bacilli. I used creosote and injections of Paquin's serum without marked benefit, and finally advised her to go to Las Cruces, N. Mex., which she did. Her cough rapidly improved, and the night sweats stopped; she gained 20 pounds in flesh in a few months and grew strong and hearty. I saw her in Keokuk July 5 last. She seemed to be perfectly well. Had she remained in the Mississippi Valley I think she would have succumbed to this then rapidly progressing disease within six months under any line of treatment."

"The highest interior of our continent comprised in the great table-land extending from the Great Divide in Colorado, through New Mexico, is not excelled anywhere in the world as a resort for consumptives. The altitude, the dryness, the purity of the atmosphere, and the large amount of ozone it contains, combine to create conditions very favorable to recovery from phthisis."—[Dr. Gatchell, in the Medical Era.

"The air here (New Mexico) is very dry, but its rarity is tonic and stimulating. The various altitudes and latitudes give a great variety of climates as to temperature and atmospheric tenuity, but all are alike in dryness."—[F. H. Atkins, M. D., S. B., in the Climatologist.

The Los Angeles Bullion says: "The climate of New Mexico leaves nothing to desire, and it constitutes an element of growth and prosperity in the future that is too important to remain neglected."

"New Mexico is fast becoming a favorite resort for consumptives, and as physicians learn more of its advantages it will grow still more rapidly in favor. Its uniform temperature, almost constant sunshine, and its dry, rare atmosphere are elements that commend this climate to our consideration."—[F. E. Waxam, M. D., professor of laryngology and rhinology, College of Physicians and Surgeons, Chicago.

"I think New Mexico surpasses any locality for consumptives I have yet visited, and I have been all over California, Colorado, the South, the Sandwich Islands, and Europe. * * * I am decidedly of the opinion that the region visited is, for consumptives, superior to any other part of the United States or the world, of which I have any practical knowledge."—[J. F. Danter, M. D., in Medical Visitor.

The Kansas City Medical Record, a high authority on such matters, in an editorial upon the subject of "Health resorts," speaks as follows: "It has been a great satisfaction to us to find our opinion regarding the sanitary characteristics of New Mexico indorsed in a most significant manner by some very high authorities on the subject. Some time ago a party of medico-scientists, commissioned by the Société Médicale of France arrived in New Mexico, after inspecting many parts of the world held in high esteem as winter and summer resorts for consumptives. Their object in thus journeying was to examine and report upon the sanitary qualifications of these different localities and countries, the end in view being the location of a large sanatorium for the treatment of consumption. The commission (with, we believe, the exception of one member, personally interested in another locality) reported upon New Mexico as in every respect better suited for such a purpose than any country they had visited, including far-famed Algeria and other places heretofore noted as health resorts, especially emphasizing the fact that a case of consumption was never known to have originated in New Mexico."

But the strongest proof, however, that the central part of New Mexico is superior to all other sections of the United States for the climatic treatment of consumption has just been given by no less an authority than the United States Government itself. The abandoned military reservation of Fort Stanton, in this Territory, has become by Presidential order the property of the Marine Hospital Corps, and the work of fitting the place up as a sanatorium for consumptives in the marine service is now in active progress. As soon as the buildings can be made ready for their reception all the consumptive patients in all the marine hospitals of the country will be taken there.

Surgeon-General Wyman says the establishment of such a sanatorium is a matter that he has had in mind for many years, his object being to place the patients where they will be under the best natural conditions and at the same time be isolated from the rest of the world, thus securing the maximum of advantage to the afflicted and the minimum of danger to the puplic.

The late Dr. Bratton, of the Marine Hospital Corps (already quoted from in this article), was stricken with consumption, and was restored to perfect health by a sojourn of two years at Albuquerque.

Dr. Bratton was instructed by the Surgeon-General of the United States to prepare a report upon the benefit of the New Mexico climate to consumptives, and also to make an examination of all the Government property in the Territory which there was any chance of the Marine Corps securing for a sanatorium for consumptives, giving his opinion about the different sites. He made an exhaustive report upon the subject, and agitation began for the donation of some Government reservation in New Mexico to the Marine Hospital Corps to be used as a sanatorium for consumptives.

This agitation resulted in the corps securing the abandoned reservation at Fort Stanton, with all its buildings and improvements, and the Surgeon-General considers it an ideal place for the purpose. Dr. Cobb, of the Marine Corps, is already on the ground with a strong force of laborers, and the work of putting the place in readiness for the

reception of patients is progressing rapidly. There are thirty-eight good buildings on the reservation, and it is thought they will afford ample room to accommodate all the consumptive patients from the various hospitals now being used along the coast, and as soon as these buildings can be made ready for the reception of all patients of this class they will be taken there at once. It is hoped by physicians, and by the friends of humanity generally, that this experiment will do much toward pointing out the way to the ultimate control of this terrible malady.

It may be added to the foregoing that Fort Stanton is a beautiful place, the main buildings inclosing an open square several hundred feet in diameter. The ample grounds surrounding, which will be beautifully kept, will add much to the comfort and pleasure of the patients and invalids, and will enable them to spend the greater portion of their time in the open air and sunshine, which plays so great a part in the recovery from this terrible disease.

But the asthmatic or the consumptive is not the only invalid who may turn his eyes with hope to this mecca of the afflicted.

To the overwrought mentally or physically, to the run down from dissipation or disease, to the prostrated, whether from devotion to business or pleasure; to those who have lost appetite, lost the pleasures of sleep, lost interest in life, whatever the cause or reason—to all these New Mexico extends her hands of healing. Her bright skies and radiant sunshine; her pure, dry, rarified air, surcharged with electricity and saturated with ozone, tonic, and invigorant; her incomparable nights, cool, refreshing, delightful, making sleep the greatest of all luxuries, and absolutely incompatible with insomnia—these are the things that come of merely being in the climate and bring their blessings of quieted nerves, restored strength, increased flesh, regained appetite, and recovered sleep, just simply whether we will or not. Such are the climatic conditions of New Mexico, to which hundreds of people who have been benefited will gladly testify.

FOREST RESERVES.

OFFICE OF THE FOREST SUPERINTENDENT,
Santa Fe, N. Mex., July 20, 1899.

DEAR SIR: In compliance with your request of the 14th ultimo, I submit report of forest reserves located in the Territory of New Mexico, namely, the Pecos River and the Gila River forest reserves.

The Pecos River Reserve is located in the northeastern part of the Territory of New Mexico, containing 22 townships, with an area of over 431,040 acres, created a forest reserve by proclamation of Grover Cleveland, on January 11, 1892, and increased to its present size by President McKinley, May 27, 1898.

The objects of forest reservations established by the Federal Government are to protect and improve the forests for the purpose of securing a permanent supply of timber for the people and insuring conditions favorable to continuous water flow or supply. It is the intention to exclude from these reservations, as far as possible, lands that are more valuable for the mineral therein, or for agriculture, than for forest purposes; and where such lands are embraced within the boundaries of a reservation they may be restored to settlement, location, and entry.

The protection afforded the young growth of timber by the creation of a forest reserve can not be overestimated, and is of permanent and lasting benefit to the States and Territories in which they are located: First, for the munificent protection afforded continuous water supply and flow by retaining the snow in the mountains until a late period of the season, furnishing an abundant supply of water to springs, wells, and other sources of supply: second, the snow acts as a cover for the young growing shrubs and small growth of timber in preserving it until the warm rains of spring diminish the cover of snow; third, the protection in winter against the chilly blasts of frigid winds that sweep across the prairies, and it is a great protection and shelter to live stock and interests of mankind in general.

The Pecos River, from which the reserve takes its name, is the principal stream flowing through the reserve. Other streams abound, but none of the value and importance of the one described. An abundance of mountain trout are found in this beautiful stream, and during the summer season many tourists and residents of Santa Fe line its banks for a brief camping vacation, rest, and recreation.

The mountain ranges in this reserve are two—the Santa Fe and the Las Vegas—ranging in height from 8,000 to 13,306 feet above the sea level.

There have been many evidences of mining interests of great value in different parts of this reserve, but no effort has been made to prospect for same. Game abounds in much variety, such as wild turkey, grouse, squirrels, rabbits, deer, cinnamon bear, and mountain lion.

There are at present six forest rangers stationed upon ten districts within this reserve, guarding the interests of the forest with ability, integrity, and honesty. Each forest ranger is under the authority and orders of the forest supervisor, residing at Willis, N. Mex., overseeing all matters, conditions, and circumstances connected with his reserve. His superior officer is the forest superintendent, who is directly responsible for the management and conduct of all matters and of all reserves of Arizona and New Mexico, and whose headquarters are at Santa Fe.

The Gila River Reserve was created by proclamation, March 2, 1899, by President McKinley. This reserve contains 101 townships, and over 3,270,000 acres, located in the southwestern part of the Territory of New Mexico.

The boundaries of the tract are described as follows:

Beginning at a point on the boundary line between New Mexico and Arizona where it is intersected by the north line of township 5 south, range 21 west, New Mexico principal meridian, New Mexico; thence easterly along the township line to the northeast corner of township 5 south, range 16 west; thence southerly along the range line between ranges 15 and 16 west, to the southeast corner of township 8 south, range 16 west; thence easterly along the township line to the northeast corner of township 9 south, range 15 west; thence southerly along the range line to the southeast corner of said township; thence easterly along the township line to the northeast corner of township 10 south, range 10 west; thence southerly along the first guide meridian west, between ranges 9 and 10 west, to its intersection with the third standard parallel south, between townships 15 and 16 south; thence westerly along the said third standard parallel south to the southwest corner of township 15 south, range 16 west; thence northerly along the range line to the northwest corner of said township; thence westerly along the township line to the northeast corner of township 15 south, range 19 west; thence southerly along the range line to its intersection with the third standard parallel south; thence westerly along the third standard parallel south to its intersection with the boundary line between New Mexico and Arizona; thence northerly along said boundary line to the point where it intersects the north line of township 5 south, range 21 west, the place of beginning.

Excepting from the force and effect of this proclamation all lands which may have been, prior to the date hereof, embraced in any legal entry or covered by any lawful filing duly of record in the proper United States land office, or upon which any valid settlement has been made pursuant to law, and the statutory period within which to make entry or filing of record has not expired: *Provided*, That this exception shall not continue to apply to any particular tract of land unless the entryman, settler, or claimant continues to comply with the law under which the entry, filing, or settlement was made.

This reserve is of great magnitude, and its principal diverse interests are mining and stock raising of all kinds.

There is an abundance of game roaming over this vast area, and a number of streams furnish an abundance of water supply. The principal ranges of mountains are the Mogollon, San Francisco, Tularosa, Black, Little Range, and Diablo; the principal river is the Gila, the river from which the reserve takes its name.

The mining interests located within the reserve are very valuable, and are developed and worked to a large extent; and the live-stock industry is thriving and prosperous, contributing much to the wealth and prosperity of the Territory.

People who are thoroughly acquainted with the object of the creation or formation of forest reserves and their maintenance by our Government for their benefit can not overlook the great importance and numerous benefits accruing, and will always be the promotion of a great and lasting supply of timber and continuous water supply or flow, affording a protection to the young and growing forests, whose value is not to be estimated, considering the many uses of future value.

There are at present one supervisor stationed at Silver City, adjacent to the Gila River Reserve line, and one forest ranger patrolling a district within the reserve.

Within a few weeks a force of four more rangers, constituting a total of five, will be assigned to the forest districts throughout the reserve, under the supervision of the supervisor, patrolling, burning fire breaks, piling brush and logs preparatory to burning when a seasonable opportunity offers itself, and also guarding zealously the interests of the forest against timber-cutting depredations, and engaging in miscellaneous duties connected with the reserve.

At present all forest rangers of Arizona and New Mexico engaged on the forest reserves are supplied with a badge with the following inscription thereon: "Forest reserve. Ranger. Department of the Interior. U. S.," an insignia of authority as an officer of the forestry reserve force.

Recently the forest force of all the reserves in Arizona and New Mexico has been equipped—each forest ranger—with the following utensils for the performance of duties connected with forest fires and the construction of trails and roads leading throughout the reserves: Ax, shovel, pick, rake, brush hook, steel file, and fire bucket. These are very essential, and aid the progress of the construction of trails and roads.

Much progress has been made in the official supervision, and duties and matters connected therewith, since their first organization and experimental stage of last August, and much more is in contemplation for the future to place the forest reserves upon a lasting and enduring basis.

I have the honor to have complied with your request. Thanking you for the opportunity of relating a brief history of forest reserves and hoping for their ultimate success, and of our great and grand growing Territory, which wishes to enter statehood, with best wishes, I am,

Sincerely yours,

W. H. BUNTAIN,
Forest Superintendent.

Hon. MIGUEL A. OTERO,
Governor of New Mexico.

EDUCATIONAL.

REPORT OF THE SUPERINTENDENT OF PUBLIC INSTRUCTION OF THE TERRITORY OF NEW MEXICO.

DEAR SIR: In compliance with your request, I have the honor to submit herewith a report of the condition of the public schools of this Territory at this date.

The first settlement of New Mexico was made in the sixteenth century by the Spaniards. From that period to the war wherein the independence of the people of New Mexico was proclaimed, being a little over two hundred and fifty years, the Spanish Government did absolutely nothing toward the education of the people of what was, under the Spanish régime, the viceroyalty of New Mexico.

From the year 1821 to the year 1846 New Mexico was a part of the Republic of Mexico. During these twenty-six years the condition of the people in this section was very little better than it was under the Government of Spain. They were far removed from the influences of civilization and were greatly oppressed in many directions. The Government of the Republic of the United States of Mexico did absolutely nothing for the education of her people. Thus illiteracy prevailed, and no effort was made to grant educational facilities to the masses of the people.

In 1846 New Mexico became an integral part of the United States of America, but for many years, owing to the peculiar circumstances prevailing, the great distance from the States, Indian wars, the civil war, and the remoteness from civilization, there was no general interest in education, and no public schools existed. Under the Mexican Government some private schools existed. The Catholic Church did good educational work and endeavored to reach as many children as possible, but the resources of the church were not sufficient to reach the masses. Many of the wealthier citizens sent their children to the States to be educated, but the masses of the people were forced by the circumstances under which they lived to pass through life without any knowledge of the simplest rudiments of learning. This state of affairs continued for many years after New Mexico became a Territory of the United States. The Federal Government neglected the educational interest of the Territory from the time of the acquisition of New Mexico until last year, when an act was passed granting aid in the shape of a donation of public lands to the public schools and the higher educational institutions.

The people of the Territory, however, through their legislative assembly, made a commencement toward a system of public schools in the year 1872, but an efficient public-school law was not passed until the year 1891. Since then the public-school laws have been greatly improved, and to-day the laws relating to public schools are liberal and comprehensive. It is found that our people are wide awake to the benefits of education and are anxious to give it to their children. The school attendance is increasing year by year and the management of the public schools is satisfactory and efficient in a vast majority of the districts.

In the year 1872 the Territorial legislative assembly for the first time enacted a law establishing public schools, and provided by taxation for their support, and from that beginning each successive legislature has labored earnestly and faithfully to build up a public-school system, increase its efficiency, and give each child in the Territory an opportunity to secure a good common-school education. Of course the first laws were crude, but improvement came with experience. Under the first law each county had five county school supervisors, but they could not by any means look after the interests of the schools in their respective counties as they should have been looked after, as the counties were very large, some, indeed, larger than some of the New England States. At that time also taxable property was limited, and the work of perfecting the school system was slow and laborious. The population was then very much scattered, and is still to-day in that condition, although not to such a great extent as during the seventies and eighties. Nevertheless under these trying circumstances schools were established in nearly every precinct in the Territory, except where hostile Indians prevented.

In 1884 the legislative assembly revised the school laws to a great extent, really enacting new laws, and establishing the office of county superintendent of the public schools, and enumerating the branches to be taught, as follows: Orthography, reading, writing, arithmetic, geography, grammar, and history of the United States. By this new law the school districts and the district school directors were created, and school districts were made corporations and given corporate rights. The law provided for a tax levy on all taxable property in the Territory not to exceed 3 mills on the dollar of the assessed valuation. This new law really opened the way for the foundation of a comprehensive public-school system, and the census of 1890 showed a decided falling off of the number of illiterates.

The legislative assembly of 1891 again amended and enlarged the scope of the Territorial school laws. A Territorial board of education was established, consisting of the governor of the Territory, the superintendent of public instruction (this office was created by this act), the president of St. Michael's College, and the president of the Agricultural College at Las Cruces. The duties and powers of this board are such that it has an opportunity to greatly advance the work of education, to keep in touch with the educational work of the several counties, and to exercise a general supervision over the acts and doings of county superintendents and district school directors.

The superintendent of public instruction is an official appointed by the governor and confirmed by the legislative council, and, under the law, must visit the several counties of the Territory each year, inspect the public schools, keep in touch with the county superintendents of education and with the principals of the city schools, making reports to the governor of all things connected with each public school system, suggest reforms and alterations in the law, and generally supervise educational work in the Territory. Under this law the Territorial board of education has a very important duty to perform, which is the selection, every four years, of a uniform system of books to be used in the public schools. This one proviso alone was, and is, the cause of great improvement in our schools. Prior to 1891 the different counties and incorporated towns used different school books. Since the enactment of the present law uniformity has been obtained, and the books used are of a superior standard.

Much good has resulted from the work of the board of education and the office of superintendent of public instruction. Many reforms have been instituted, and many more are contemplated. The law of 1891 provide "That school boards must provide schoolhouses, teachers, fuel, and necessary supplies for the schools," and provides for a tax levy on the taxable property of each district not to exceed 5 mills on the dollar on the assessed valuation of all the property in the district. It also directs that the Territorial auditor shall levy a tax not to exceed 8 mills on the dollar on all of the assessed valuation of the property in the Territory. This is collected by the county treasurer and apportioned by the county superintendents to the different school districts of the county on the first Monday of January, April, and June, and such apportionment is based upon the number of children of school

age residing in each district. The funds so derived are expended for teachers' salaries, printing, and the salaries of county school superintendents. In addition to this, the school funds of the several counties receive part of the fund from licenses issued, also all the fines assessed for violation of the law, and the licenses collected for the privilege of selling liquor. There is also a poll tax of $1 levied on each able-bodied male person for school purposes. It will thus be seen that the people of the Territory are taxing themselves very heavily for the support and maintenance of the public schools and the education of their children.

The law provides for the holding of a county institute for teachers for at least two weeks in every school year in every county, and makes it compulsory upon the teachers to attend the same. At such institute instruction is given to teachers in the branches to be taught in the schools and in the best methods of teaching. The attendance of children between the ages of 8 and 16 years is made compulsory by law.

As to the money collected for school purposes since the first school law went into effect, it is only practicable to give a correct statement since 1891, as the records of the Territorial auditor's office prior to that time were partially destroyed and greatly mutilated through a fire which destroyed the Territorial capitol building, wherein this office was situate, early in the spring of 1892.

It is found from the records that in 1891 the amount of money raised for schools from Territorial taxation was $85,192.17. The average daily attendance for the Territory was 12,397 pupils. The number of teachers employed was 407. The average daily attendance at each school was 34 pupils.

In 1895 there was raised for the public schools $154,107.38. The number of teachers employed was 538; average daily attendance for the Territory was 15,081 pupils; average length of school term, four months; average daily attendance at each school was 28 pupils.

In 1898 the amount of money raised for school purposes was $182,172.18; number of teachers employed was 541; average daily attendance for each school was 30 pupils; average daily attendance for the Territory was 16,558 pupils; average number of months taught, five. It will thus be seen that the average daily attendance of pupils has increased 4,161 in number in the past seven years. This is a progress of no mean degree when it is taken into consideration that in many of the precincts and school districts settlements are very scattered, ranches are far apart, and the children have to travel many miles to reach schoolhouses. Surely this is progress of no mean degree.

In addition to the public schools of the Territory there are at present in active and successful operation the following Territorial institutions: The Agricultural College, at Las Cruces, with two substations, one at Las Vegas and one at Aztec; the University of New Mexico, at Albuquerque; the School of Mines, at Socorro; the Normal University, at Las Vegas; the Normal School, at Silver City, and the Military Institute, at Roswell, and the School for the Deaf, Dumb, and Blind, at Santa Fe. These institutions during the last past school year have had 405 scholars attending them.

The value of the property embraced in the above institutions is $191.025.45. This in a Territory that had no public-school system before the year 1872.

As to sectarian schools, the Catholic church has eighteen of them in operation, attended by 1,602 pupils, employs 72 teachers, and has school property to the value of $231,700.

The Methodist Church supports eleven schools, attended by 462 pupils, and has school property valued at $10,000.

The New West Educational Commission supports five schools, attended by 219 pupils, employs 7 teachers, and has school property to the value of $44,000.

The Presbyterian Church supports twenty-five schools, attended by 1,105 pupils, employs 25 teachers, and has school property to the value of $37,900. The average number of months taught by the sectarian schools is nine months in the year. These results have all been attained by the people of New Mexico through their own efforts and without any Government aid. This showing, while not as creditable as we would wish, is at the same time one of which our people can well be proud. Children to the number of 3,152 attend the sectarian schools. This fact always counts against the Territory when statistics are compiled, because these are based upon the number of children of school age and attending the public schools.

The total average daily attendance for the Territory is 20,273 pupils, counting the attendance at the sectarian schools as well as the attendance at the public schools and at the higher educational institutions. The number of pupils enrolled in the public schools of the Territory during the last school year was 23,061, which, added to the number attending sectarian schools, brings the number of children attending school in the Territory up to 26,776.

UNIVERSITY OF NEW MEXICO, ALBUQUERQUE.

It can readily be seen that this attendance must greatly reduce the per cent of illiteracy within a few years, and I look forward to the coming census to demonstrate the fact that this has been reduced. From the best information at hand at the present time I judge the illiteracy has been reduced to 15 per cent.

New Mexico is fast moving forward in the line of education, and those who think we are sleeping in this matter will find themselves mistaken and, I hope, agreeably disappointed.

Many of the public-school buildings in the Territory would be an ornament to some of the rich and populous States of the Union. The buildings and institutions maintained by the Territory are handsome and commodious and furnished with all modern improvements. In all the Territorial institutions libraries have been established and are being added to yearly as opportunity offers and funds allow.

During the coming school year I expect a still more rapid improvement, as railroad facilities in the Territory are increasing and it is becoming easier and cheaper to travel. People from the country are becoming more accustomed to sending their children to the city schools, which, of course, will increase the average attendance.

In this report I have not counted the Government Indian schools maintained at Santa Fe and Albuquerque and at the Navajo and Mescalero Indian reservations and at the several pueblos of Jicarillas, Apache, and Pueblo Indian agencies. I have only considered the free public schools and the institutions maintained by taxation by the Territory.

Neither have I made notice herein of private schools established in the larger towns of the Territory, for the reason that I have received no reports from such. I estimate the attendance of these private schools at from 250 to 300 pupils, but I have not added these figures to the number given heretofore in this report, as I desire to be guided simply by official facts and figures.

Upon the whole, I believe that the people of New Mexico have no occasion to be ashamed of the progress made within the past eight years in their public-school system.

Very respectfully,

MANUEL C. DE BACA,
Superintendent of Public Instruction.

Hon. MIGUEL A. OTERO,
Governor of New Mexico, Santa Fe, N. Mex.

IMPORTANCE OF EDUCATION.

Investigation, agitation, discussion, and progress are characteristic of the age in which we live. Popular education, which lies at the foundation of popular government, is attracting greater attention each year on the part of all persons who look to the common people as the real source of power. To all such persons the free common schools stand out prominently as the mightiest factor in the training of that intelligent citizenship which is absolutely necessary to the welfare and perpetuity of a free government. It is a difficult matter for anyone to realize the size and importance of the vast army employed in the public schools of the United States, or to have conception of the greatness and grandeur of the common schools.

DISTRICT SCHOOLS.

A limited investigation will make it plain to anyone that lack of organization and system is to-day the greatest source of weakness in the district schools. While all incorporated towns and cities in the country have recognized the necessity of systematic work, and have effected proper organizations with carefully prepared courses of study, made effective by proper and efficient supervision, the rural school, in which are found a great majority of the entire enrollment of the Territory, are in many instances almost without organization, system, or supervision. All this is due, in a great measure, to the imperfection of the present school law. It is, however, an undeniable fact that

under the present law wonderful results have been accomplished since its enactment, but it has failed to keep pace with the progress of the times. What was good enough ten years ago is not good enough now. The time has come when the legislature should take the law in hand and amend it in a great many particulars, especially in the matter of granting more power and authority to the various county superintendents. Under the existing laws they have no power or authority to prevent or correct evils of any nature. They should be clothed with full authority to investigate and approve all contracts of whatever nature, for whatever purpose, before any school funds are used; to suspend any teacher or school director for cause, and to have full control over the supervision of all the common schools in their counties, and to be subjected to a penalty for a failure to comply with their duties. At present a county superintendent is a mere figurehead, with no power or authority unless it be to sign warrants for the payment of the teachers' wages.

In spite of all the disadvantages under which we have had to work, it is a matter of sincere congratulation to all the friends of public education to know that great progress has been made during the last few years in educational matters throughout the Territory. This is especially true as to our city schools, where funds have been ample to secure the services of competent superintendents and teachers.

Our city schools will compare favorably with those of any city in the Union. The teachers are graduates of some of the best institutions of learning in the United States, and fortunate indeed have been our city boards of education in securing the services of such competent instructors.

TERRITORIAL INSTITUTIONS.

I beg to call particular attention to the reports of our Territorial institutions of learning. They will be found as a part of this report. The Territory boasts to-day of a university, a school of mines, a college of agriculture and mechanical arts, two normal schools, a military institute, and a school for the deaf and dumb and blind.

These institutions are thoroughly equipped in all particulars and have met with most satisfactory progress. The attendance is increasing from year to year, and their fame is spreading all over the country, as is proven by the students who are coming to attend from without the limits of the Territory.

TERRITORIAL CERTIFICATES.

Our present school law contains no provision for the granting of Territorial certificates. The laws of all the States in the Union contain such provisions, and it is earnestly to be desired that our next legislature will grant authority to the Territorial board of education to grant Territorial certificates to such teachers as may be entitled to them on account of their long and successful career. There are many well-known educators in our Territory whose services in the cause of education have been so valuable that they are entitled to the honor of having in their possession life certificates entitling them to teach in any section of the Territory.

ATTENDANCE.

The statistics of school attendance are watched with much interest, because they indicate the appreciation in which the schools are held by the people.

I am pleased to report that there is a marked increase in the enrollments and attendance in nearly all of the schools of the Territory.

EXAMINATION OF TEACHERS.

In looking over the great field of public education in the United States we perceive that while in general the work has been with the same common aim, which is the diffusion of secular knowledge and civic virtues among the people, at a particular epoch in the history of education in the several States efforts of educators assume varied directions.

In the formative epoch their energies are employed in securing legislation looking toward the creation and preservation of their system.

When this has been attained and the schools have been placed on a solid foundation, the main object is to convince the people of their necessity and to prevail upon parents to send their children to them regularly for a certain period during the year. In New Mexico we are yet in the formative state in our educational development, because the want of sufficient revenue has somewhat retarded our progress. In the formative period emphasis is especially placed upon securing a sufficient revenue to maintain and improve the system. The most important duty is to select and support a corps of properly qualified and efficient teachers. It is my opinion that the efficiency of the schools would be greatly augmented by the organization of a permanent board of Territorial examiners, for the purpose of passing upon the qualifications of all persons presenting themselves to be examined for positions to teach in the public schools of the Territory, such a board to be composed of persons of experience in teaching and in school work of the Territory; and by reason of the further experience to be acquired in this particular work they would be accounted the most reliable authority in determining the value of the answers submitted to them. I am confident that a system of this kind would insure the employment of teachers upon the ground of their fitness, scholastically, morally, and socially, and would redound to the greatest possible improvement in the schools of the Territory. The certificates to teach thus obtained would be valid in every county for the period for which they would be issued, and would free their holders from the annoyance of frequent examinations, to which they are now subjected. Provision should be made establishing a limit to teachers' certificates of all grades. Under the present law they are valid indefinitely.

If a Territorial board of examiners be provided for, it would not be absolutely necessary for all candidates to appear in person for examination. The questions prepared by the board could be sent to some reliable person in each district, before whom the candidates could answer the questions in writing, and after the same had been examined by the Territorial board, a certificate would be issued according to the merits of each candidate.

SCHOOLHOUSES.

Some of our school districts, towns, and cities have erected handsome and commodious schoolhouses. Among others may be mentioned Clayton, Taos, Albuquerque, Socorro, Deming, Silver City, Gallup, Eddy, Roswell, Las Cruces, and others. These schoolhouses are models of neatness, cheerfulness, health, and comfort. They are pleasant homes for the pupils, make school attractive, and change the

work from a disagreeable task into a welcome privilege. Our incorporated cities have erected schoolhouses some of which are perfect specimens of the improvements of modern school architecture.

TEACHERS' INSTITUTES.

The utility of teachers' institutes as a means of increasing the efficiency of the teaching corps and arousing public sentiment in favor of public education is becoming from year to year more generally recognized.

Institutes of this sort, to be productive of good, must be understood and appreciated. They must be adopted from choice and not from compulsion. Educators and school officials will always be found to advocate and favor whatever attempts to promote the good work of public education. There are many good reasons for holding these institutes. All States which provided for them early in the history of the public school system have adhered to them more closely as time has progressed. They are regarded as an essential part of the general work and school legislation of the State. Everywhere it is held to be as binding on the teacher to attend the institute, at least once a year, as it is for the child to go daily to school during the term. These institute meetings become popular wherever they are held; the people approve them because by their means they are enabled to perceive the character of the teaching and the methods followed in the training of their children. They are thus instructed themselves, and induced to renounce many prejudices that they may have entertained. The great object of institutes is to instruct teachers in the philosophy of their profession. Lectures are delivered to point out how the teacher should conform his teachings to the laws of the development of the child's mind.

It is clearly the duty of the Territorial legislature to provide the means for institute work. During the past year almost every county in the Territory held an institute. The attendance was fair and the work accomplished very satisfactory. When the Territory provides the means with which to conduct the institute the attendance will be more than double, and many poor teachers who could not otherwise attend will get the benefit of such reunions. I suggest that the Territory be divided into five institute districts and there be appointed by the Territorial board of education a district conductor for each separate district; that all rules and regulations for the conduct of this institute be made by the Territorial board of education, and that for the defraying of the necessary expenses of the work the legislature appropriate an amount which it may deem sufficient.

Our law concerning normal institutes is a good law, but it is weak in two particulars. It imposes no penalty for nonattendance and requires the teachers to pay a fee for the defraying of the necessary expenses of the institute. The latter many teachers can not do. If the law is amended so as to impose a penalty for nonattendance and a small sum of money set aside from the general school fund, say about $100 from each county, for institute work, the attendance will be more than double and the results will be very gratifying.

SCHOOL DIRECTORS.

The present law provides that school directors when once elected shall remain in office until their successors are duly elected and qualified. Under this law numerous abuses are committed for the reason

that the directors are the same persons empowered to issue the call for elections and to hold the same. In a great many instances no elections are held at all, and consequently the directors perpetuate themselves in office indefinitely. Unless the law is properly amended abuses will continue to be committed, as there is no power to remedy the evil except by invoking the aid of the courts.

In this connection I would respectfully suggest that a law be passed requiring all county superintendents to have their offices in the county seats of their respective counties. Quite a number of our present superintendents have their offices in remote places, which causes great inconvenience to all parties interested in school affairs.

UNIVERSITY OF NEW MEXICO.

The University of New Mexico was established by an act of the Territorial legislature of 1889, and the location of the institution fixed at Albuquerque, N. Mex. As soon as funds would permit, the regents secured the necessary area of land required by the enacted law and commenced the construction of the building. In May, 1892, the structure was completed and accepted by the board of regents. On June 15, 1892, the normal department of the university was opened for students, and during the following September a preparatory department was opened. This institution has been in successful operation five years, having conferred during this time fifteen diplomas of graduation in the regular courses and many certificates of satisfactory work in the more limited courses of study. The standard of work has risen steadily, and the facilities for the study of the liberal arts and sciences are being continually increased to meet the growing demands of the community. Material development has kept pace with internal growth, and the university, with its commodious buildings and growing apparatus and library, can now offer better facilities for study and scientific research than ever before, embracing a wide variety of subjects taught by specialists in every branch.

The University of New Mexico, located at Albuquerque, is the natural and logical head of education in the Territory. It is equipped and supported wholly by Territorial appropriations and receives ample support. It is expected that when New Mexico secures statehood the university will receive a liberal grant of public lands, as similar institutions in other States have, when its usefulness will be very much increased.

There are three departments—the academic, commercial, and normal—the latter having been organized with the special view of training competent teachers for the public schools. Admission to the academic course is either upon a certificate from some other school of acknowledged thoroughness or upon examination in English, history, grammar, and arithmetic.

During the past year the board of regents built a substantial gymnasium and equipped it with the best apparatus obtainable. The results of training in this line have been closely noted, and have proved satisfactory in every respect.

Good board can be obtained in Albuquerque for $20 per month. At the present time the university has no work at its command for students, but a number of students have found congenial employment about the city from which they have been able to defray a large portion of their expenses. During the coming year a special effort

will be made to assist students who so desire to find employment for their hours of recreation.

The normal department is especially recommended to those who intend to teach. Thorough instruction is given in such branches as are taught in the graded and high schools, and in the history and theory of teaching, including correct methods of study, instruction, and discipline.

The several courses of study in the university have been prepared with great care by experienced educators, and while the institution is young, it is expanding to meet the growing demands of the times, and it is certainly deserving of the support of the people of New Mexico, for it rests alone with the Territory to realize the promise of this rising institution.

The university has had a fairly prosperous year. The policy of dropping the lower grades has been continued. In doing this about thirty students were refused admission. Most of these attended the city public schools during the year. The number enrolled in the university during the past year was over eighty; the average age of those enrolled the current year is a little above twenty years. This gives some idea of the maturity of the students; whilst we have not advanced far beyond the college preparatory stage, it is believed that the real scholarship of our students ranks much above other schools whose classes have more advanced names.

From the normal department several young men and women were graduated. These were mature, strong persons, and they will no doubt succeed as teachers. To give a more exact idea of the work of the university, we append a list showing the number of students pursuing certain branches of study. In this list English includes the various branches of that study, such as grammar, rhetoric, literature, etc. Algebra, 20; arithmetic, 13; astronomy, 5; botany, 4; bookkeeping, 18; chemistry, 6; drawing, 16; English, 48; theory of education, 4; ethics, 4; Latin, 26; psychology, 4; physics, 5; physical geography, 6; Spanish, 37; stenography and typewriting, 28; school management, 4; zoology, 16.

Material advancement has been made along several lines. The library is steadily growing, both from the Congressional publications that it receives as Territorial depository and from purchases made from the matriculation fees. It now contains over 1,000 bound volumes and about 400 pamphlets. These have all been catalogued according to the most approved system, and thus the library is very valuable for ready reference. It is much used by both students and faculty, and the public is welcomed to it at all reasonable times. Funds for the enlargement of the library are greatly needed.

In the department of science some advancement has been made. That department has been assigned to a separate head, and some important apparatus, such as an electrical machine, air pump, etc., has been added.

The chemical laboratory has also been improved. But in all these improvements the board has been compelled to practice the most careful economy, often to the hindrance of advancement of pupils. A special teacher of Spanish has been employed, and from the large number of students who have taken that subject it is easy to infer the value placed upon it. Those branches which appear to offer some immediate pecuniary return attract students. It is doubtful whether any other offers greater commercial value than Spanish.

Two prosperous literary societies have been formed, which afford

opportunities for the acquirement of experience and freedom in public address, and open avenues to social culture; an athletic association has promoted interest in physical culture, and students have acquired editorial experience by issuing a very creditable "Annual." No cases of discipline have marred the harmony of what may be regarded as a very successful year.

Taking all things into consideration, this school has been very successful, and each year finds it improving.

On behalf of the board of regents of the University of New Mexico, and in accordance with the requirements of the statute, I submit a report of that institution for the year ending October 31, 1898.

There will be found attached hereto a statement of the receipts and expenditures for the period above mentioned, from which it will be seen that the expenditures have amounted to $13,903.52 and have exceeded the receipts during the same period by the sum of $1,238.52. It is to be noted that these expenditures exceed those of the previous year by the sum of $2,914.14. This increased expense is principally in the items of salaries and insurance. We have paid out for salaries $1,576.16 more than during the previous year, and we have paid $753 for insurance which is to run for a term of three years. It has also been absolutely essential to expend considerable money upon laboratory and gymnasium equipment.

This increase of expenditures appears to have been unavoidable. During the previous year we had been able to secure the services of some instructors for little or nothing while they were pursuing special studies under the direction of our faculty, but it was not to be expected that this should continue. We have been compelled to add to the number of instructors in order to meet the demands made upon us and to keep up the work which had already been begun.

Your attention is called to the annual catalogue of the university, from which it can be seen that the character of the work of the university is growing in importance and breadth, and, as we believe, the public is receiving a greater return for the small amount expended than is given by any institution of like character anywhere in the United States. In order to continue this work, however, it is absolutely necessary that there should be an increase in the revenue of the institution. Unless provision is made by the coming legislature for this, it will be absolutely necessary for us so to reduce our expenses as to cripple the institution and possibly lead to our losing the services of the best members of our faculty. Our information is that there is no similar institution in the country paying as low salaries for the same class of services. We have thirteen persons employed in giving instruction in the university at salaries which aggregate $937.33 per month. We trust, therefore, that you will strongly recommend to the legislature that provision be made in some way to increase the income of the university.

This is especially of importance not only for the purpose of paying current expenses, but some method should be provided for creating a fund for building purposes. Upon this point I desire to quote from the report which was made to one of your predecessors in 1896, as the statements and requests then made are still applicable to our condition:

"The board of regents desire to call your attention, and, through you, the attention of the legislative assembly, to the fact that it was the intention in creating the university to establish an institution which would be of benefit, not to any particular locality, but to the inhabitants of the whole Territory. An examination of the enrollment of the students will show, however, that a large majority of them reside in Albuquerque, where the university is located. Since the opening of the present school year there has been, I believe, some increase in the number of students from other places, but still the number of such is not nearly as great as it should be. In the opinion of the board this is principally due to the unwillingness of parents and guardians to send their children and wards to a town like Albuquerque, where these young people would be compelled to live in boarding houses or hotels, practically free from any supervision or control by the school authorities. The erection of a building where students from abroad can be boarded and lodged, which shall be conducted under the supervision and control of the faculty, is imperatively demanded in order to make the institution what it should be. An examination of our receipts and expenditures will show that with our present income it is absolutely impossible for us to do anything in this direction which would be of any substantial value. Notwithstanding the utmost economy, we can do but little more than bring our expenditures within our income. We earnestly urge upon you that you recommend to the legislature that

provision be made so that we may have a building fund of not less than $20,000 provided in addition to the money now appropriated. If we could double the number of students in attendance they could be instructed and cared for with no great increase of ordinary current expense."

It is true that in consequence of the former report and the statements therein contained the legislature did attempt to provide a means for the board of regents to obtain funds for building purposes, as will be seen by reference to Chapter LXII of the laws of 1897; but it has been quite impossible up to the present time for the board to obtain any money under the provisions of that statute.

Very respectfully,

F. W. CLANCY,
Secretary and Treasurer.

Receipts and expenditures during year ending October 31, 1898.

RECEIPTS.

From Territory	$12,440.00	
Tuition fees	275.00	
Laboratory fees	50.00	
		$12,765 00

EXPENDITURES.

Salaries	10,613.16	
Expense	483.97	
Building	8.00	
Improvements	23.85	
Fuel	330.75	
Furnace	2.00	
Insurance	753.00	
Repairs	96.60	
Furniture and fixtures	33.00	
Laboratory	230.75	
Natural history	14.50	
Library	359.97	
Gymnasium	200.46	
Water	63.20	
Scientific apparatus	265.95	
Advertising	272.30	
Bacteriological laboratory	52.08	
Stationery	4.80	
Telephone	24.00	
Commencement, 1898	121.88	
		13,903.52
Excess of expenditures over receipts		1,138.52

THE NEW MEXICO MILITARY INSTITUTE.

The youngest, most vigorous, and most thoroughly typical of all the Territorial institutions is without doubt the military school at Roswell. Though it has received less money than any of the schools, costing the Territory less than $30,000 to date, the results have been almost phenomenal. The regents make a biennial report to the governor, and an annual inspection by the adjutant-general is required by law. Chiefly from the last report of the regents (January 2, 1899) and from the report of the adjutant-general (May 12, 1899) the following is compiled:

The legislature of 1895 authorized the issue of bonds to the amount of $15,000 to erect suitable buildings for the military institute, and an annual tax levy of twenty one-hundredths of one mill for the school's maintenance. The National Congress of 1895–96 failed to legalize the acts of the preceding New Mexico legislature, and in consequence it was impossible for the regents to negotiate the said bonds, so that it was not until June, 1897, that they were finally sold and the proceeds rendered available.

From February, 1896, to June, 1897, however, the regents received from the auditor a total of $8,342, of which sum $2,748.33 had been expended previous to January 1, 1897, in the erection of a waterworks plant, pump house, machinery, and necessary outbuildings, fencing the grounds, and various minor incidental expenses, which will be found carefully itemized in the regents' report to Governor Thornton, December 31, 1896.

Thus on June 2, 1897, the regents had available the following:

Proceeds from sale of bonds	$14,250.00
Unexpended balance of total received from auditor	5,593.67
Total	19,843.67

Pending the negotiation and sale of bonds, plans for school buildings had been accepted, surveys had been made, the grounds fenced, planted, and irrigated, the waterworks system constructed and operated, and all things as far as possible made ready for the erection of necessary school buildings.

Work was promptly begun after final sale of bonds and in March, 1898, the school buildings were accepted.

The main building is of brick, trimmed with red sandstone, three stories, with additional basement story of gray limestone, containing four large section rooms and study halls, forty-five bedrooms, library, and offices, a large mess hall, kitchen, laundry, armory, storerooms, closets, and bathrooms.

The system of waterworks and sewerage is very complete, afford hot water and cold water on every floor, plunge baths and shower baths, and complete drainage. The water-closets are the best obtainable; the 10,000-gallon tank, with bottom 52 feet from the ground, gives a pressure sufficient to throw water over the main roof and sweep the main sewer at pleasure. This sewer ends at a much lower level 500 yards away.

The entire building is piped for gas and every room, hall, and stairway is so lighted. The acetylene gas plant is cheap, safe, and very effective. The generators are placed 100 feet from the building and give a total of 2,500 candle power at a cost of about $1 per night.

The building is heated by steam, the large boiler being located in basement near the closets.

The contractor lost something over $1,000 and his time, but the Territory has one of the best school buildings in the West.

In January, 1898, the regents employed James G. Meadors as superintendent, and in March following he reported for duty and set about the organization of the school.

In April, 1898, four additional instructors were employed and ordered to report for duty the following September.

The usual circulars and advertisements were printed and industriously circulated and the superintendent ordered to make a vigorous personal canvass of the entire Territory. This was done with great effect and at insignificant expense.

During the spring and summer the buildings were completely furnished with the best equipments obtainable for a first-class boarding school, and the schoolrooms with the best desks and seats now in use.

One of the regents, an experienced merchant, was sent East and gave fifteen days of his time to purchase of furnishings.

The furniture, bedding, kitchen, laundry, and dining-room equipments are not only the best obtainable by the regents for the money

at their disposal, but the best now in use at boarding schools. Few hotels are so well or so substantially equipped.

On September 6, 1898, the regents formally opened the school, and 85 students were admitted during the first week. There are, at the date of this report, 105 students in regular attendance.

The attendance so far exceeded expectations that more room was at once necessary. A 10-room cottage was erected on the grounds for the families of superintendent and domestics at a cost of $2,087.

Our barracks are, however, still crowded, and we need quite twice as much room as at present.

We are almost wholly without scientific apparatus, we have no library save a few hundred books owned by private parties, we have no society halls, gymnasium, or stables, and we find that we need not less than thirty more bedrooms for cadets.

We need quite twice as great accommodations as we have at present, and if supplied at once we believe the school could be made well-nigh self-sustaining within a few sessions.

Eighty Springfield rifles, model 1884, with their accoutrements, were furnished by the Adjutant-General, for which satisfactory bond was made. But these rifles are rather heavy for cadet use, and the school really needs 100 cadet rifles.

The school also needs at least 50 sabres and cavalry accoutrements, as provision has been made to teach cavalry tactics, in which branch of the service the Western soldier henceforth should be most proficient.

The school also needs at least enough cannon and ordnance supplies to render possible instruction in artillery drill. We have now ample facilities otherwise for giving such work, and trust that the needed guns and supplies will be furnished by the Territory or National Government.

The military features of the school have been emphasized by the regents in all possible ways, for it is not intended that the object of creation shall be for a moment forgotten.

Great care has been taken with our commissary, which has been well managed. The food supplied for cadets has been thoroughly good, wholesome, and abundant. The lodging has been excellent.

The health of cadets has been carefully attended to by a surgeon regularly employed, while the enforced exercise, baths, diet, study, and sleep have placed the boys, without exception, in perfect physical condition. In order, however, to maintain a good commissary, it is necessary that the school should earn a large sum of money outside of aid received from the Territory, and we question if this is possible unless our accommodations are increased.

It would undoubtedly appear the most economical course to erect sufficient buildings to render the school practically self-sustaining—a matter that now seems possible.

Total cost of school up to date has been as follows:

RECEIPTS.

Total amount received from Territorial auditor	$12,842.00
Proceeds sale of bonds	14,250.00
Received for board and tuition first half session 1898–99	5,094.50
Received for board and tuition second half session 1899	500.00
Total receipts	32,686.50

DISBURSEMENTS

Lithographing and selling bonds	$146.16
Waterworks contract	2,034.00
Fencing	505.50
Tree planting	132.25
Pump house	96.00
Procuring title to land	85.00
Sewer contract	557.75
Insurance	272.58
Cost of buildings	19,195.40
Furniture and fixtures	3,003.06
Salaries	2,266.60
Domestic help	600.00

Commissary	$1,993.10
Expense	893.71
Surgeon and medicines	111.55
Laundry	132.45
Lights and fuel	450.39
Office	211.00
Total disbursements	32,686.50

All bills are carefully receipted and filed and subject to inspection at any time.

In the selection of instructors the regents have employed vigorous men, of experience, and graduates of the best colleges; for they have believed an army of useless employees is in this country a needless expense and a business incumbrance.

The same is true of all domestics and other employees.

It has been the aim of the regents to buy nothing not needed, to have nothing not thoroughly usable, and to hire nobody for whom there was not plenty of work ready and waiting.

There have been no jobs, political, social, religious, or otherwise; contracts have been let by sealed bids; the prices have been the best procurable; nor has anything been done except on sound business principles.

The course of study at present is the usual four years of military schools, with three years training school work below the fourth or entrance class.

It is not desirable to maintain more than one or two such preparatory classes.

Hereafter cadets holding appointments from their respective counties must be able to enter the fourth class.

It is probable that the total annual cost of maintaining the institute will somewhat exceed $15,000.

Without undertaking to institute any sort of comparison, the fact remains that, up to now, no school in New Mexico or the entire Southwest ever did so much with so little within so short a time, or took so commanding a position among the people to whom it looks for support.

While we are persuaded that the system upon which it is operated is best adapted to the conditions that now obtain in New Mexico, we are also convinced that the school is wasting no money on superficial fads, impossible ambitions, or impractical schemes.

It has been the design of the regents to make a training school of the first order, modifying that design as needs and conditions are modified, growing as grows the State, advancing as the people advance.

We believe the facts justify this presentation of the case, and we are sure that the school is a credit to the Commonwealth. (Report Regents of New Mexico Military Institute to Governor Otero, January 2, 1899.)

The legislature of 1899 authorized a tax levy of twenty-seven and one-half one hundredths of 1 mill annually for the institute's maintenance, but did nothing toward the erection of more buildings and quarters. This would probably have been done had the regents less faithfully represented the literal facts. It seemed almost incredible that such phenomenal progress could be made in so short a while, or that such energy, thrift, and broad-minded views would obtain where it was possible to use every dollar appropriated for needs purely local and ends more or less selfish, and very little was really expected by the Territory at large.

In April, 1899, the superintendent of public instruction, who, with the governor, is an active regent of this school, made a visit of official inspection. He gave no notice of his visit until actually on the grounds.

He carefully examined the course of study and general management in all details. He found that quite one-third of the attendance consisted of Spanish-Americans. The latter were very enthusiastic, declaring that nothing could be better or fairer than their treatment, and manifested in both bearing and convictions the supreme triumph of loyal Americanism.

The superintendent of public instruction expressed great satisfac-

tion with the fidelity of the regents, the management of Superintendent Meadors, and the efficiency of the instructors. He pronounced it the "leading Territorial institution" and the "most representative school in the West."

Acting under Special Order No. 4, dated Santa Fe, May 4, 1899, the adjutant-general made his annual inspection of the New Mexico Military Institute as required by law. In his report to the governor, dated May 12, 1899, he says:

The inspection was made on the 8th day of May, 1899, and was as thorough in every respect as the same could be made. The notice to the superintendent of the intended inspection was received by him on the same day of my arrival in Roswell, so that there was but little time for preparation, and the conditions I found must necessarily have been the ordinary or normal condition of the institution. I inspected every room in the building, beginning with the dormitories. I found the bedsteads used were of cast iron, made for one person, each room being occupied by two students. I tumbled the bedding off and closely examined the mattresses and bedding, and found the same fresh and clean and free of vermin. The floors and walls of the buildings throughout showed most cleanly care. Especial attention was given to an examination of the closets and the drainage therefrom. I found that a sewer pipe had been extended from the school building in a southeast direction to the river, affording perfect drainage from the closets and bathrooms. The plumbing seemed to be in perfect order, and I was unable to detect any bad odors in or about the closets, or about the entire building.

I made a close examination of the groceries and provisions found on hand, and in every instance found the quality excellent and free of adulteration. I dined at the institution and was served with the same kind of food that was given the students. I found the food plentiful, well cooked, well seasoned, and in fact just such a dinner as may be found in the homes of people of middle life all over the country.

I witnessed an exhibition drill of the cadets, both in company and battalion formation, and was greatly pleased with their movements, which showed excellent instruction and discipline. I made a careful inspection of the cadets, of their arms, accoutrements, and uniforms and found all in good condition. The arms furnished by the Territory are kept in a room in a basement set apart for that purpose, and appear to receive good care. I found 65 cadets present for duty, and they appeared very proficient in the most recent system of tactics, and even the smallest cadets were familiar with modern tactics, the manual of arms, and the advanced bayonet exercises especially adapted to the Krag-Jörgensen rifle.

The college building is a handsome substantial structure of brick containing three stories and a basement, situated about one-half mile north of the business center of Roswell. The grounds extend over 40 acres of land overlooking the town. The situation is a beautiful and a healthy one. The building contains 30 nice, airy, wholesome bedrooms, besides class rooms, office, kitchen, dining room, pantry, laundry, bathroom, and closets. The furnishings are comfortable and substantial. The recitation rooms are equipped with excellent twentieth-century chair desks, which are said to be the most comfortable now in use. The building is heated by steam throughout from a large boiler in the basement, and there is a good supply of hot and cold water on every floor. The building is lighted by an excellent acetylene plant located about 100 feet away. The water supply is furnished by a tank of 10,000 gallons capacity, which is kept filled by means of a steam pump.

An examination of the course of study reveals the practical nature of the school. Four years of preparatory work are required, so that any student can enter who knows how to read, write, spell, and apply the fundamental rules of arithmetic. The preparatory course is followed by four years of collegiate work. The studies are such as are usually found in institutions of like character. The text-books in use in the preparatory course are those adopted for use in the Territorial public schools. In addition there is taught the art of war, the manual of arms, and in fact everything usually taught in high-class military schools. Especial attention is paid to proper gymnastic exercises and reasonable and healthful athletic sports necessary to the physical, mental, and moral good of the students.

There are employed in the institute a superintendent, commandant of cadets, three instructors, matron, engineer, two cooks, janitor, and laundryman at a cost of $6,000 per annum. The superintendent, Maj. James G. Meadors, is a graduate of Washington and Lee University, of Virginia, and is a gentleman of fine culture, full of energy and zeal, devoted to the institution, ambitious to succeed,

and, if properly supported, will make the institute so successful that every citizen of New Mexico may well be proud of it. The success already attained, the progress made in a single year, is highly creditable to the superintendent and to his able assistants, as well as to the people of Roswell, who take great and commendable pride in the institution. Mr. J. W. Willson, commandant, a graduate of the Virginia Military Institute, is an excellent man for the place. Of the other instructors, Mr. W. S. Fitzgerald, a graduate of Vanderbilt University; Mr. W. H. Whitten, graduate of Massachusetts Institute of Technology; Mr. L. Martini-Mancini, graduate of military school of Italy, ex-lieutenant of cavalry, I saw but little. They are all gentlemen of fine appearance and address, are represented to be excellent instructors, and give to the superintendent a hearty and loyal support. Mrs. Meadors, the matron, is an excellent, kind-hearted lady, who gives her whole time and care to the institution, takes great pride in the success of her husband's administration, and contributes very materially to such success. * * *

The institute is provided with 80 Springfield rifles, calibre 45, and their accoutrements. These were furnished some months ago under your order, although the institute was not entitled to them under any law in existence. They are simply regarded as a loan until such a time as the necessities of the National Guard may require their return. In my opinion provision should be made by law for properly equipping the institute with arms. The Springfield rifle is not at all suited to the younger cadets, being entirely too heavy. They should be supplied with a piece of modern artillery, sabres, and other arms necessary to teach and illustrate the art of war.

The eminent success of the institute in this the first year of its existence gives great encouragement for the future. This hope, however, may be frustrated by a failure to make prompt provision for its immediate necessities and for its expansion. Already the dormitories are filled to the limit of their capacity. There are 30 students in attendance who live or board at Roswell, outside of the institute. I regard it as of the utmost importance, and necessary to the success of the institute, that all students should reside in the barracks.

There is an immediate demand for more commodious quarters. The institute should be provided at once with 30 more bedrooms, a room for a library, gymnasium, society halls, and storehouse. The laundry should be removed from the basement and placed in a separate building. I am aware that much of this can not be accomplished without legislative authority, but if there exists authority in the board of regents to provide for the more pressing needs of the institute by the construction of a temporary board structure, I should strongly recommend its exercise. (Report of Adjutant-General to Governor Otero, May 12, 1899.)

The New Mexico Military Institute has thus within a single year completely filled the quarters provided and which were expected to suffice for a dozen years, and fully refuted the almost slanderous assertion that the native population cares nothing for education and has not yet become an assimilated part of the Republic. The governor is convinced that the superintendent of the New Mexico Military Institute correctly appreciates the situation. In a recent interview he said:

Our course of study really embraces eight years, four of which are preparatory and four collegiate. The latter four are modeled upon the West Point course, as far as we are able. We give in the collegiate work four years in mathematics, two years of scientific work, three years in Latin, two in German, three in Spanish, and four in English. We think that it is now of vast importance that young men should know thoroughly the English and the Spanish languages; have a sound business training, but a training of habits and methods as well as mere knowledge of details; have some ideas of practical construction and even of fortification, and a fair knowledge of military tactics. We think our commercial relations as well as government service will presently require large numbers of young men with just such training, nor can we fail to note the analogy between present conditions and those which have obtained for more than a century in British India, where there has always been a demand for young men thus trained. As to New Mexico, I do not see a particle of difference between the cadets of Spanish and Anglo-Saxon extraction. After twenty years' experience in the management of school boys I cheerfully attest that I have handled none more tractable, more decent, better mannered, more intelligent, or more thoroughly in earnest than these Spanish-Americans. Of course all influences to which they are subjected are intensely Americanizing, but I find them, to begin with, profoundly patriotic.

It is well to note here that fully 95 per cent of the inhabitants of Chaves County, where the institute is located, are Anglo-Saxon, and a large majority originally from Southern States, where race prejudice is supposed to run high.

All points considered, the governor thinks that the military institute is the most hopeful sign and the most convincing argument, educationally, that could be adduced as to New Mexico.

Hundreds of reputable witnesses attest that there is no better commissary at any eastern school; that the military work is thorough and according to modern usages and standards; that the instruction is excellent, the discipline thorough, the treatment of all fair, just, impartial, and absolutely honest.

It would be impossible to find a better location for a military school, as there is practically neither rain nor snow during the entire session, and hardly a day when the sun does not shine. The great abundance of excellent water at Roswell, the great number of orchards, trees, and variety of industries are also great advantages.

The earnings of the institute for the year ending June 7, 1899, exclusive of funds from the Territory, were something over $9,500, derived entirely from tuition fees. The disbursements for the year are reported as being about $23,000. It is the governor's opinion that affairs are economically administered, and the entire management energetic and effective.

Without prejudice or undue partiality, the conviction is forced upon a calm observer that such a school in such a country, properly managed, will accomplish great results, and beyond a doubt the military institute at Roswell has not only fully realized the most sanguine hopes, but has more than tripled conservative expectations and demands.

The New Mexico Military Institute is owned and supported by the Territory of New Mexico, and was first opened for students in September, 1898.

The institute is located at Roswell, 3,700 feet above the level of the sea, in the best-watered region between the Indian Territory and California. The climate is perfection—little rain or snow during the session, dry atmosphere and perpetual sunshine.

The school receives about $12,000 annually from the Territory and during the session of 1898–99 earned $9,500 additional in tuition fees, enrolling 105 cadets.

Buildings, etc., cost $30,000; thoroughly furnished and equipped, four stories, gas-lighted, and steam-heated; hot and cold water on all floors; modern bath, lavatories, and closets; complete system of waterworks, sewerage, and fire apparatus. Everything new and modern.

There are five men instructors, who are graduates of the best colleges. Health and development of students carefully looked after; ample facilities for all athletic exercises; daily drill, regular sleep, diet, and exercise; surgeon regularly employed. No better subsistence department in the Union; good, abundant food, clean rooms and beds.

The course of study embraces eight years, and includes English, Spanish, Latin, German, French, mathematics, and natural sciences. Instruction in bookkeeping, typewriting, and stenography in both English and Spanish.

No politics, no sectarianism, no extravagance. Students must remain within the inclosed limits day and night. Excellent discipline and moral training.

Three terms of three months each. Examinations and reports to guardians at end of each term.

The school is reached by the Pecos Valley and Northeastern Railway from Pecos on the Texas and Pacific Railway, or from Amarillo on the Fort Worth and Denver Railway, or by Star Route from Lincoln or Fort Sumner.

Session begins September 6, 1899, and ends May 31, 1900.

FACULTY.

Col. J. G. Meadors, superintendent, Washington and Lee University.
Maj. J. W. Willson, commandant cadets, Virginia Military Institute.

NEW MEXICO SCHOOL OF MINES AT SOCORRO.

Capt. W. S. Fitzgerald, Vanderbilt University.
Capt. L. Martini-Mancini, School of Arms, Italy.
Capt. W. E. Davis, Washington and Lee University.

COUNTY APPOINTEES.

The commissioners of each county in New Mexico appoint one cadet annually to the New Mexico Military Institute. Appointee receives board and tuition free. He must deposit on entrance a fee of $50 for laundry, medical attendance, breakage, and incidentals.

NECESSARY EXPENSES.

Tuition, board, lodging, laundry, and medical attendance, September to June, $200; uniform (blouse, trousers, and cap), $12.50 to $19; books and stationery, $6 to $10.

COURSE OF STUDY.

Preparatory classes.—Class A: Spelling, reading, geography, language lessons, arithmetic, writing.
Class B: English grammar, spelling, reading, arithmetic, geography, United States history; writing.
Class C: English grammar, reading, spelling, United States history, arithmetic, physical geography, writing.
Class D: English grammar, arithmetic, spelling, algebra, general history, physiology.
Collegiate classes.—Fourth class.—First term: Algebra, rhetoric, English history, Spanish, Latin, drawing.
Second term: Algebra, geometry, rhetoric, English history, Spanish, Latin, drawing.
Third term: Algebra, geometry, rhetoric, English history, Spanish, Latin, drawing.
Third class.—First term: Geometry, English literature, Spanish, Latin, drawing.
Second term: Geometry, English literature, Spanish, Latin, trigonometry, drawing.
Third term: Trigonometry, English literature, Spanish, Latin, surveying, drawing.
Second class.—First term: Analytical geometry, Spanish, German, Latin, physics, tactics.
Second term: Analytical geometry, Spanish, German, Latin, physics, tactics.
Third term: Analytical geometry, Spanish, German, Latin, physics, tactics.
First class.—First term: Calculus, astronomy, geology, chemistry, German.
Second term: Calculus, astronomy, geology, chemistry, German.
Third term: Calculus, Spanish history, geology, chemistry, German.

THE NEW MEXICO SCHOOL OF MINES.

The New Mexico School of Mines is a Territorial institution, founded by the Territorial legislature in 1889. The act creating it provides that the school of mines shall be supported by an annual tax of one-fifth of a mill on all taxable property within the Territory. This levy was increased by the Territorial legislature, in 1899, to twenty-seven and one-half hundredths of a mill.

The legislature located the school of mines at Socorro, the county seat of Socorro County. Its campus consists of 20 acres of level meadow land within the irrigable district, 1 mile west of the Rio Grande and 1 mile northwest of the railroad station. The laboratory building is situated nearly in the center of these grounds.

Socorro, a city of 4,000 inhabitants, is on the western slope of the Rio Grande and on the main line of the Atchison, Topeka and Santa Fe Railroad, about 75 miles south of Albuquerque and 179 miles north of El Paso, Tex. It is at an elevation of about 4,600 feet above sea, and, having a salubrious climate, is preeminently a pleasant and healthy location. Socorro is an attractive city for health seekers from the East who need a mild and dry climate, and every year many persons seek its

hospitalities. In the city are two hotels, several good boarding houses, three large public-school buildings, and a court-house that cost $45,000. The church denominations represented here are the Baptist, Presbyterian, Episcopal, Methodist North, Methodist South, and Catholic.

Socorro has one of the best public water works in the Territory, furnishing a very soft, pure water. The supply comes from hot springs that issue from the base of the Socorro Mountains, about 4 miles west of this city. Two weekly papers are published here. There are also a brewery, artificial ice works, roller-process flouring mill, and a fire-clay plant, which manufactures brick, pottery, tiling, sewer pipes, crucibles, scorifiers, muffles, and almost everything requiring a fine grade of fire clay.

ADVANTAGES FOR STUDY.

The pure air and water, cool mornings and evenings, high elevation, and absolute freedom from malarial influences are some of the climatic conditions with which Socorro is favored and which are essential for thorough and systematic study. Living expenses here are as low as in any other city in the West. While some of the schools of mines in the East charge $200 or more per year for tuition, this institution only charges its students a nominal tuition fee for materials consumed.

The New Mexico School of Mines enjoys the natural advantages of being located in the midst of a region peculiarly rich in minerals of nearly all kinds, and is within reach of the most varied geological conditions, all of which are within a radius of 20 miles of Socorro. Almost the entire geological column, from the precious metal bearing formations of the Archæan to the coal beds of the Tertiary, is here exposed. The industrial processes connected with mining and metallurgy may be also seen at Timber Peak, Magdalena, Kelly, San Pedro, Hillsborough, Kingston, Lake Valley, Cooks Peak, Georgetown, Silver City, Pinos Altos, Los Cerrillos, Gallup, Carthage, and elsewhere within easy reach of the school. These illustrate the most modern methods of mining, milling, ore dressing, concentrating, smelting, lixiviation, chlorination, etc., as well as the native Mexican methods, which are worthy of careful study, since the like can not be seen elsewhere in the United States.

The grounds immediately adjacent to the school of mines include irrigable land, plateaus, and mountain formations, all affording an excellent field for practice in surveying, laying out of railroads and irrigating canals, topography, mine engineering, and geology, so that students can be prepared at the very doors of the school in these branches, which usually require tedious excursions from Eastern schools of mines.

The Territory of New Mexico, so far as concerns the mountainous portion, which comprises nearly two-thirds of its area, and is nearly all mineral bearing, is less known geologically than, perhaps, any other section of the United States—Alaska excepted. A slight study of the plateau region of the northwestern portion of the Territory has been made under a recent United States Geological Survey, but only in a general way. No attempt has ever been made under Government auspices to investigate closely the geological structure of the New Mexico Mountains such as has been carried out in the other Rocky Mountain States and Territories, or to study the conditions of New Mexican mineral deposits, as has been done in Colorado by Emmons, in Nevada by Curtis, in California by Becker, and in other States by distinguished investigators.

The field for original scientific research in New Mexico is unrivaled by any other mining section, and the opportunities here offered are not neglected in the plan and scope of instruction. It is proposed that much of the advanced professional work of the school shall be of an original nature, to the end that the graduates may be skilled theoretically and practically in the very problems which they, as professional men, will be called upon to solve. In connection with this work it is hoped to enlist every chemist, geologist, mining engineer, metallurgist, and other scientific investigators capable of observing and recording professional experience in the Territory. This work will be carried on by the advanced students, under the direction of the professors, and will involve the collection of notes, sketches, maps, and specimens, and the results of directed observation in all matters relating to the sciences and arts embraced in our courses of study. The results of these observations, together with illustrations and analysis, will be published from time to time in the scientific press and in special bulletins issued by the school. While this plan of instruction will furnish material for practical and original research on the part of the advanced students, it is believed that it will also be of great practical utility to the industries of the Territory, and that in an important sense the school will have for its students not only those who may study within its walls, but also the greater part of the educated mining population of the Territory.

The subjects for such research in geology, mining, and the reduction of the ores of lead, silver, gold, and copper are so numerous that it is impossible to attempt to do more here than to mention the fact that the conditions of climate, drainage, water supply, geological structure, etc., in New Mexico differ greatly from the conditions existing in other parts of the Rocky Mountains, giving rise to new problems in practice. But these problems are not by any means all that deserve attention. The investigation of the ores of iron, manganese, aluminum, cobalt, nickel, and tin, together with the beds of coal, saline salts, alums, building stones, mineral paints, cement rocks, fossil meals, etc., will be directly in the line of the advanced laboratory work of the school, and every student who undertakes such work will be encouraged in every possible way to accomplish the best results. During the senior year every candidate for graduation is required to make a thorough scientific investigation of some subject connected with his course of study and to embrace his results in a thesis.

COLLECTION OF MINERALS.

The school of mines now has a collection of several hundred specimens of minerals found in the Territory. It is desired to make the collection representative of the entire mineralogy of New Mexico. Specimens for the cabinet will be received and acknowledged with thanks.

COURSE IN SURVEYING.

This course is outlined for the purpose of giving the young men of the Territory an opportunity to gain a fair knowledge of plane surveying and leveling, and to fit themselves for the duties of county surveyors, should opportunity so offer.

The value of knowing how to run a line of levels for ditch work in an arid country by bringing water from a distance and properly distribute it over a large ranch is a matter of no little consequence, and much work in this direction lies in the near future. The knowledge of properly restoring lost section and quarter-section corners, setting

the blank half-mile corners on the north and west sides of townships, along the township and range lines, is a matter of much importance, and often confusing to the regular graduate in civil engineering.

Both the analytical and graphical methods are used in calculating irregular and angular tracts of land. Surveys are made by the magnetic needle, and on the limb of the instrument by front and back sights, and the possible and probable errors in both methods are thoroughly discussed.

Plane trigonometry.—Phillips and Strong's Elements of Trigonometry.

Surveying.—Johnson's Theory and Practice of Surveying (only certain portions of the text will be used).

Drawing and Platting of Surveys.—Field practice three hours each day.

This course can be completed during one semester (19 weeks) by any one of ordinary ability, if sufficiently prepared.

A surveyor's certificate is granted for the satisfactory completion of this course.

Hon. C. T. Brown, of Socorro, offers a gold medal to the student showing the greatest proficiency in assaying, chemistry, and metallurgy.

The outlook for the school of mines for the coming year is very bright indeed. Through the liberality of the last Territorial legislature the levy was increased as above stated, which increase in funds has enabled the trustees of the school to employ another professor, William C. Phalen, B. S., a product of the Massachusetts Institute of Technology, who will have direct charge of the departments of chemistry and geology. This increase, however, is not enough to derive the proper revenue for the support of the school as was the intention of its founders.

The erection of ore crushers, stamp mills, reduction, concentrating, cyaniding plants, etc., are necessities which should be added to the school as early as possible, in order that miners and prospectors may have their ore tested in ton lots so as to ascertain the most economic and satisfactory method to which the ore is adapted to treatment. This alone would save the people of the Territory thousands of dollars annually, as well as keep the money at home, which is going out into other States.

Few of our citizens are aware that the laboratory building ranks about fourth in size to any found on the Western Continent. It is to be noted that of the six technical students which attended school during the past session, that four were over 32 years of age, and one being 71 years of age. This latter gentleman no doubt would carry away the laurels over any other institution as regards age. The courses taught in the institution leading to a full degree are three in number, viz, (1) chemistry and metallurgy, (2) mining engineering, and (3) civil engineering.

These courses extend through a period of four years each. It is on the plane of applied sciences that theory and practice meet.

Indoor work is interspersed almost each day with outdoor exercises in geology, engineering, etc.

The examinations are very thorough and rigid. It is therefore impossible for any pupil to successfully pass on any subject without a thorough knowledge of the same before examination. Seventy-five per cent of the questions submitted are required to be answered correctly in order that a pupil be entitled to pass any particular subject.

Since young women have recently been allowed the privilege to attend the school of mines a general course in science is contemplated, being created for the purpose of the young ladies having a parallel course extending through a period of four years, as in courses for young men leading to the degree of B. S. of general science. Should any young woman feel disposed to take any of the engineering courses, there is nothing to hinder her from doing it if she so elects. Two women have already taken special courses in assaying and chemistry, and we will have a young woman pupil the coming year who intends learning assaying, in order to aid her father who is a miner.

It can be truthfully said that the school of mines is accomplishing a great deal of good, and serves as a bureau of general mining information as well as performing its duties as a technical mining school.

The amount of inquiry regarding the mineral and mining industries by people from the East is growing to stupendous proportions. It is therefore the policy of the school in answering these numerous inquiries to give nothing but reliable data, as near as can be obtained. Within the last year the school of mines has approached nearer its true line of work as designated by its founders than it heretofore has ever been able to do.

The usefulness of the school in its special line of work is approved and recognized by every observing citizen as a factor of much good.

Since it is now possible for the school of mines to realize soon some of the benefits of the 50,000 acres of land donated by Congress, the people of the Territory are now practically assured of an institution of learning that will not only do credit to the Territory and reflect honor on her citizens, but will be one of the great centers where people from all over the country will come to seek and acquire technical knowledge and training emanating from the New Mexico School of Mines.

REPORT OF BOARD FOR THE ASYLUM FOR THE DEAF AND DUMB.

SANTA FE, N. MEX., *July 27, 1899.*

SIR: Complying with your official request of recent date, the board of trustees now in charge of the New Mexico Asylum for the Deaf and Dumb beg leave to report to your excellency the desired information regarding said institution.

Up to 1897 the deaf, dumb, and blind children of New Mexico had no opportunity to receive an education, no schools, private or public, having existed in the Territory prior to that time.

By an act (chapter 31) of our legislature approved February 24, 1887, a school for the education of the deaf and dumb children "resident in this Territory" was established. The school was opened with Lars M. Larson as superintendent (who has been employed in that capacity to the present time) and Miss B. E. Larson as matron or assistant teacher.

From that time to the present one to thirteen children per year, as Mr. Larson informs us, have received an education—five of these children were, in 1896–97, in the school as private pupils, the school having closed for want of funds. Mr. Larson was given authority to conduct a private school.

Although the school when established was made a Territorial school, it had not been declared a Territorial institution until the thirty-second legislative assembly of the Territory of New Mexico, by an act approved March 15, 1899, declared it so, naming it "Asylum for the Education of the Deaf and Dumb." This law created a board of five trustees for the management of the asylum. Prior to that time the school had been under the control of a committee composed of the attorney-general of the Territory, the auditor, and the treasurer of the Territory.

During the years of 1897, 1898, and 1899, four Indian pupils, two boys and two girls, have been receiving their education in the institution at the expense of the United States Government, the Government having paid for their education the sum of $1,748.17. This money was not turned over to the Territory, our predecessors having allowed Mr. Larson to keep it, the said Indian pupils having been admitted as private scholars.

The law of 1887 provided that pupils not indigent should pay such amount as the committee should fix, and the Territory to pay for the indigent children. We can find no record or minute to show what was done with the money thus to be charged, nor what amount was collected, but Mr. Larson informs your board that something like $366 were by him collected from that source, and that said amount was retained by him under authority of the committee, as he claims, for board.

The present board was organized on the 10th day of April, 1899, the day fixed by the law of 1899, and elected Mrs. T. P. Gable as president and Benjamin M. Read secretary of the board.

We found the school was opened and was being conducted without funds, and at once ordered it closed on the last day of May, 1899, and to continue closed until the funds are available to pay off the debts incurred prior to our taking charge of the asylum, and to reopen as soon as we have money to conduct it on a cash basis.

We have ascertained, as near as we have been able to, from the official reports of the auditor of the Territory the exact financial condition of the institution, and find that, including the sum of $1,182.80 now due Mr. Larson, there has been paid out by the Territory the sum of $26,219.49 in purchasing land, building, and paying teachers' salaries from 1887 to May, 1899.

The real estate property of the asylum consists of one three-story brick building and a small addition, also of brick, and 4 or 5 acres of land. Only about from one-half to 1 acre of this land has been improved; it has a few fruit trees, and it lies immediately in front of the building.

The building and part of the land back of it cost (bought from Mr. Larson) the sum of $4,000, but the same was not completed at that time and the Territory had to expend a considerable amount to finish it. The small piece of land now improved was bought from Placida Sandoval for $75, making a total of $4,075, which is the amount paid for the real estate now owned by the asylum.

Of personal property, such as desks, maps, and all other school paraphernalia, dishes, beds, etc., the total value is about $500. In other words the asylum has in property, real and personal, the sum of $4,575. It also has a library of something like 250 volumes, but which did not cost the Territory a cent, the ladies of the board of trade of the city of Santa Fe having donated the same to the asylum some time ago.

Although our predecessors have constantly repaired the buildings, they are to-day far from meriting the name of a Territorial institution. The whole building needs repairs badly. In its present condition it is no credit to the Territory; poverty is apparent on every side.

We are at present hampered for want of funds as well as on account of the debt hanging over the institution, and see no prospect, as your excellency well knows, to open and to continue the good work of the asylum until next year, unless the money which is to be derived from the public lands shall come before that time.

Hoping to have satisfactorily complied with your request, and expecting your valuable aid in securing funds to put the asylum in repair and open the school soon, we remain,

Yours, very respectfully,

Mrs. T. P. GABLE,
President.
BENJAMIN M. READ,
Secretary.

Hon. MIGUEL A. OTERO,
Governor of New Mexico.

PRIVATE SCHOOLS.

SAN MIGUEL COLLEGE, SANTA FE.

This college, founded by the Christian Brothers in 1859, still holds its own as one of the leading institutions of learning in the Southwest. In the beginning the Brothers took quarters in rented buildings, but to-day they have their own buildings, which have cost nearly $50,000.

The college is unendowed and it has not received any share of the public funds. It has been self-supporting from its foundation.

One hundred and forty pupils have been enrolled during the present year.

The course of study consists of the English language, mathematics, commercial branches, phonography, typewriting, chemistry, assaying, and music.

The college has a well-stocked cabinet of minerals and a good chemical laboratory.

The Christian Brothers also conduct the La Salle Institute, at Las Vegas, with an attendance of 110 scholars, and a school in Bernalillo with 100 scholars.

ACADEMY OF LORETTO.

The Academy of Our Lady of Light was founded by the Sisters of Loretto in 1853. The first sisters started from the mother house in Kentucky June 26, 1852, and arrived in Santa Fe the following October, accompanying the late Archbishop (then Bishop) Lamy, who had gone to the States to procure teachers for his extensive diocese. They were four in number, with Mother Magdalen Hayden as superior. They were unable to open school until January 1, 1853, having to acquire the Spanish language. As soon as this was accomplished they commenced to teach in the house which Bishop Lamy had given them opposite the cathedral. Here they remained until 1855, when they moved to the present site, it being a much more desirable location. The lot on which stands "La Casa Americana," so called because it was the first house with a shingle roof in Santa Fe, was given to the Sisters by Bishop Lamy, who always had the welfare of the school at heart. Here good adobe houses were built and the school began a prosperous career. Its good name spread and soon the house was filled with boarders, fifty being the greatest number. The present academy was finished in 1881, and cost about $24,000. It is furnished with modern improvements, gas, water, steam, etc., and is noted for its bright, sunny, well ventilated school rooms. The course of study includes the elementary and higher branches of an English education. Phonography, typewriting, painting, music, plain and ornamental needlework, etc., are likewise taught. The number of boarders is not so great as in former years, on account of the branch houses of the order, which are scattered throughout the Territory. The academy was incorporated in 1874.

They also have a select day school in connection with the boarding school. The total attendance this year is 80.

The historical old adobe building formerly occupied by the Sisters of Loretto has been torn down and in its place a beautiful three-story brick building has been erected at an expense of about $10,000.

In the city of Santa Fe an excellent private school has for some years been carried on by Miss Gulliford and her family, who are all skilled in scholastic work.

Miss Gulliford is a certificated teacher from the School of Art at South Kensington, London, England, her sister (an assistant in Miss Gulliford's school), having graduated at the Royal College of Music and the Guildhall School of Music, thus insuring the most approved methods of vocal and instrumental instruction.

Special attention is given in this school to modern languages, particularly German and French, and students of the ordinary curriculum are already proficient in colloquial French when completing the school course. Geography is studied as a science, embracing a practical knowledge of the products of various countries, the chief ports of shipment, and the shortest and most convenient routes of commercial transportation. Great importance is attached to correct English grammar and composition, and to the minutiæ of detail, which build up perfection of scholarship. Music, drawing, painting, and deportment are all carefully studied, and pupils pass out of this

school thoroughly equipped for professional or commercial pursuits, and fitted also to discharge and adorn the duties and demands of domestic life.

INDIAN SCHOOLS.

The Indian industrial schools at Santa Fe and Albuquerque, supplemented by the several Government schools at the various pueblos, are all doing fine work. Nearly every Indian child in New Mexico is provided with the means of education, and the schools are very largely attended.

For many years it was difficult to obtain the consent of the Indian parents for the education of their children at these public institutions, as they had much hesitancy in permitting their children to leave home and go under the control of teachers. All this is now changed, and the parents are taking the greatest interest in the schools, in many instances showing an anxiety to have their children educated.

From present appearances, the majority of the Indian children of the Territory will be well educated in a few years, just as the other youths of the Territory are. The work being done in these institutions is such as to greatly improve the conditions of these wards of the Republic, and it will soon place them in a position to be self-supporting.

ALBUQUERQUE INDIAN SCHOOL.

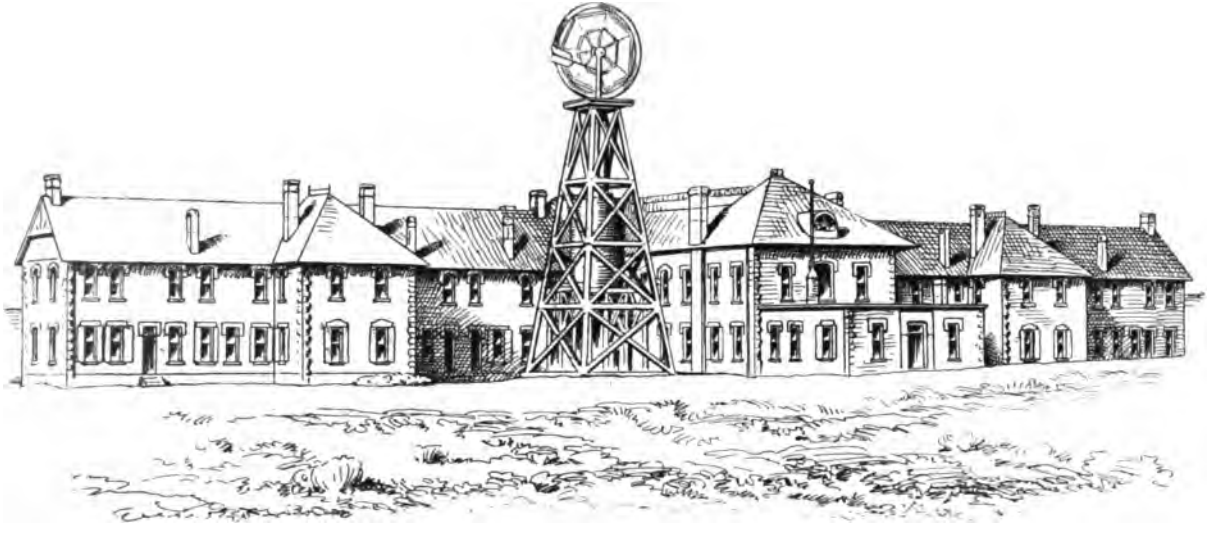
The total enrollment of this school was as good as last year, being 320, and the average attendance 301, which is as large a population as can be healthfully accommodated with the present plant. A number of improvements have been made within the past two years, among which may be mentioned a new ring bath system for the pupils, the installation of electric lights, a new steel tank tower, the further development of our wells, whereby an abundance of pure water is obtained in place of the very bad water that we have had heretofore.

The paramount need of the school for years has been a sewer system, and Congress at its last session appropriated $14,000 for that purpose. When this system is complete the sanitary condition will be changed from poor to excellent. The health of the school has been good, no deaths having occurred for more than two years. The pupils have made commendable progress both in the school room and in the industries. Among our employees who are doing good work are a shoemaker, harnessmaker, assistant seamstress, and assistant cook, who have learned their trades here alone, and other pupils are nearing a state of efficiency that will enable them to assume similar responsibilities. The industries taught are cooking, laundering, carpentery, harnessmaking, shoemaking, tailoring, farming, and simple work in blacksmithing. A manual training department has been lately added to the institution and it promises to be an important factor in Indian education, as it is in the public schools of the larger cities of the country.

It is believed the Indian problem is somewhat nearer a solution than it was a few years ago, and while it is difficult to measure accomplishment by years, the effect of the total work done is plainly discernible.

SANTA FE INDUSTRIAL SCHOOL.

This school is located about 2 miles south of the city of Santa Fe on the Albuquerque road. It was opened in October, 1890, with a capacity of 150 pupils, and was created as an Indian normal school in January, 1894.



GOVERNMENT INDIAN SCHOOL, SANTA FE.

The industries taught in this school are cooking, sewing, housekeeping, tailoring, shoemaking, blacksmithing, carpentering, laundering, and farming and gardening by irrigation. The farm consists of 160 acres, 10 acres consist of 5 acres of school campus and 5 acres of garden under irrigation.

The buildings are all of brick, well and substantially built, and lighted by electricity, and are named in order of size. Main school building in form of Greek cross; central building, 40 by 160 feet, two stories, each wing 40 by 140 feet, two stories. Employees' building, brick, two stories, with storeroom, kitchen, dining room, and fourteen employees' rooms, each with a large alcove; two bathrooms. Hospital, two stories, with ten rooms, dispensary, and bathrooms. Laundry, one story, three rooms and engine room, well equipped with steam washer, mangle, stationary tubs, centrifugal drier, etc. Shoe and tailor shop, two stories, four rooms. Tailor and 8 apprentices; shoemaker and 8 apprentices. Store, one story with basement. Blacksmith shop, one story, frame; capacity, 1 blacksmith and 6 apprentices. Carpenter shop, one story, frame; capacity, 1 carpenter and 6 apprentices. All necessary barns, sheds, hose house, oil room, hennery, etc.

Water supply, from the city waterworks, is abundant for all school needs and the irrigating of 10 acres. Sewerage ample and in good condition.

It is an acknowledged fact that the Pueblos and Navajos are among our most observant Indians. As a class they are the best reasoners among our Indian tribes. They are quick to detect shams and apt to see the good and bad qualities in men and things. They are more fully alive to the value of that which is good in white men's ways, and equally awake to the bad. They are more eager to adopt that part of our education in which they can see a commercial value than any Indian whom I ever met. They see almost instinctively the difference between a real mechanic and a pretense. They are willing to allow their children to remain a long time as apprentices, provided they can see that the instructor and appliances are of the best. And they do not seem to need any instruction to enable them to judge which is real and which is false.

In making my recommendations to the Indian Office I have had in mind the foregoing characteristics of the people with whom we must deal, and also the other, and perhaps more patent, fact, that our field is almost limitless. For instance, in the Santa Fe Agency alone are more than 1,000 Indian children of school age who have never been in a school of any kind. Among the Navajos (who are within our reach) are enough to fill three such schools as I ask for, and among the Utes within our reach are as many more. Besides this, our normal department extends to the entire Indian population of the United States, there being only three schools that make any pretense to a normal department, and these departments have just and equal claims upon all graduates of the various Indian schools.

In my recommendations I have asked that this school be raised in all departments to a real normal training trades school of a capacity of 600 pupils. I would not have the funds asked for expended slowly, but would that in a short time the school would be in full operation in all its branches, fully and generously equipped.

My estimates are made upon a very conservative basis, and to make the necessary improvements so as to put the school in working order with a population of 600 will require every dollar that I have asked

for. Indeed, I have left not the slightest margin. I append herewith a recapitulation of my request:

For trades building	$15,000
For equipment of same	5,775
Addition to main building	2,600
Addition to warehouse	1,500
Addition to school building	6,600
New dormitory building	26,000
For heating plant	8,700
For water and sewerage	8,000
For repairs and improvements	8,000
Support of 300 pupils, at $167 per capita	50,100
Total	122,275

In the $15,000 "trades" building are to be taught the following branches: Blacksmithing, wagon making, painting, shoemaking, tailoring, tinning, plumbing, printing, sloyd, mechanical drawing, etc.

The equipment means two 80-horsepower boilers (to be used for steam heating and power), one 50-horsepower engine, and the necessary shafting and pulleys.

The "addition to the main building" is for modern bathrooms and water-closets; the "addition to school building" means four additional schoolrooms to the building now under construction; the "dormitory" explains itself; the "heating plant" is for piping and radiators within the buildings, and for the pipes from the boilers to the buildings. It is perhaps in order to call your attention to the fact that this school is already a regular normal school, having quite a class of young men and women from several different tribes, graduates of various Indian schools, who are preparing themselves for teachers in the service.

United States Indian Industrial School.

Number of schools	1
Number of months taught	12
Number of instructors	32
Enrollment	296
Total daily average	285
Total receipts	$50,050
Total expenditures	$50,050
Total value school property	$49,904
Total amount of salary paid to instructors	$17,680

COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

Origin.—The New Mexico College of Agriculture and Mechanic Arts, under a slightly different name, was established by the twenty-eighth legislative assembly of the Territory of New Mexico, by act approved February 28, 1889.

The purpose of this institution is clearly defined in section 19 of this act: "The agricultural college created and established by this act shall be nonsectarian in character and devoted to practical instruction in agriculture, mechanic arts, natural sciences connected therewith, as well as a thorough course of instruction in all branches of learning bearing upon agriculture and other industrial pursuits."

The branches in which instruction may be given are set forth as follows in section 20 of the same act: "The course of instruction of the college hereby created shall embrace the English language, literature, mathematics, philosophy, civil engineering, chemistry, animal and vegetable anatomy and physiology, the veterinary art, entomology, geology, political and rural household economy, horticulture, moral

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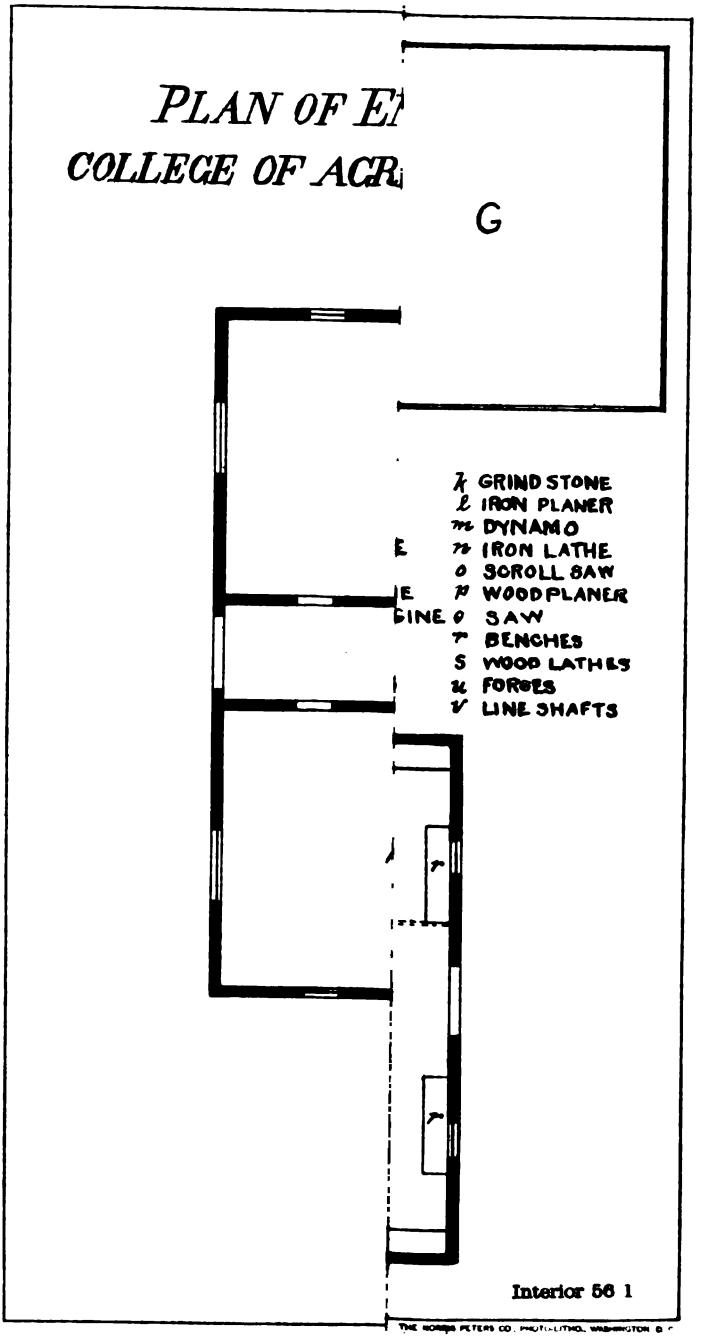

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UNIV OF MICH

philosophy, history, mechanics, and other sciences and courses of instruction as shall be prescribed by the regents of this institution of learning."

By section 25 of the same act the assent of the legislative assembly was given to the establishment of experiment stations within the Territory of New Mexico in connection with the agricultural college, in pursuance of the act of Congress approved March 2, 1887, known as the Hatch Act.

Income.—The revenues of this college are derived from the following sources: (1) Students' fees. (2) Sale of college farm products. (3) Territorial tax and special appropriation. (4) The United States under Congressional act of March 2, 1887, the Hatch fund. (5) The United States under Congressional act of August 30, 1890, the Morrill fund.

The money received from students and from the sale of products from the college farm has, so far, been very limited in amount, and has been used principally for paying expenses not provided for by either of the acts of Congress.

From the beginning the college has steadily grown in the number of students in attendance and in the confidence of the people, until last year there was a total enrollment of 215 pupils.

Four general courses are offered, namely, agricultural, mechanical engineering, civil engineering, and scientific, each of these being four years in length, leading up to the degree of bachelor of science. Besides these, there are shorter courses in bookkeeping and stenography and typewriting.

The laboratories are unusually well equipped, and are being added to continually. During the past year an electric dynamo and motor have been put in. Several additions have been made to the equipment in the chemical department, and the apparatus in the biological department has also been added to. A new building, called a station building, has been completed, and in it are located the chemical laboratories and lecture rooms, biological laboratory and lecture rooms for teaching anatomy and physiology, botanical laboratory rooms for the entomological department and the bookkeeping department. The building is an ornament to the place, and fills a long-felt need. A girls' dormitory was also completed during the year, and is now completely furnished and in use.

Many valuable experiments have been and are being carried on in the experiment station. Those relating to the cultivation and care of sugar beets have been especially satisfactory, and large numbers of farmers in different sections of the Territory have cooperated in this work, with the result that it has been practically demonstrated that New Mexico can grow as fine sugar beets, running as high in sugar content, as are grown anywhere in the world. The college invites the patronage and confidence of the people of New Mexico because of its large corps of efficient teachers, its well-equipped laboratories, its unsurpassed location, and the genial climate of the section in which it is built, which makes it the finest college of its kind in the entire Southwest.

DEPARTMENT OF ENGINEERING.

In the engineering course instruction is given by lectures, recitations, and practice work, so combined as to constitute a symmetrical course of study. The endeavor is to provide the student with a broad foundation of general and theoretical knowledge, together with a liberal amount of practice in the line of his chosen profession.

After taking the elementary drawing and the bench work in wood, which are given by the department to all college students, those who elect engineering continue on advanced work in these subjects, and, in addition to the general studies in mathematics, physics, chemistry, English, language, Spanish, political economy, history and literature, their course includes descriptive geometry, theoretical and applied mechanics, hydraulics, engineering structures, metallurgy, electrical engineering, strength of materials, mechanism, machine design, steam engine and shop practice in carpentry, wood turning, blacksmithing and machine work, and a thesis for graduation. While the shop practice develops considerable ability in the student as a craftsman, yet, the educational features of this work are the most valuable and are constantly emphasized.

The laboratory is used to give the student an opportunity to put into practice the principles taught in the class and drafting room. An example of this method of teaching in all colleges of agriculture and mechanic arts may serve to explain the great difference between these colleges and those organized for literary and normal work.

After taking enough elementary free-hand and mechanical drawing to enable him to interpret such work, the student makes a correct drawing of some mechanical device, the drawing including the making of a tracing and blue print. He next goes into the wood room and constructs a pattern after the dimensions given in the drawing. Next in turn the pattern is molded in the foundry, and the casting is finished and the parts assembled in the machine room. At the same time, with this practice work, the student receives from text-books and lectures a thorough drill in mathematics, and their application in problems in hydraulics, roof and bridges, strength of materials, the generation and transmission of electric energy, specifications, etc.

The equipment of the engineering department consists of two buildings arranged for the work. One of these contains two large and well-lighted recitation rooms, a hall, a boiler room, machine room, and woodworking room. The second building contains room for forge and foundry work.

The motive power consists of a 40-horsepower steam plant and a 15-horsepower oil engine. The machinery is all of modern and improved design. It is expected that additions will be made to this equipment each year, as is done in all agricultural and mechanical colleges, and that the department will thus be enabled to offer to the student the most valuable preparation possible for his profession. The citizens of the Territory should give this engineering-laboratory feature their most substantial support, for the plant is a permanent one, growing more and more valuable each year, and giving additional educational training of increasing value to students in proportion to the extensiveness of the equipments. Gifts of machinery, drawings, photos of engineering work, or loans of these things to the engineering laboratory, will be of great value to the students, and will be appreciated by them.

An excellent department library, containing standard and special works on the subject pertaining to the engineering professions, is accessible to the students.

DEPARTMENT OF AGRICULTURE AND HORTICULTURE.

The work of this department is of a dual character, the more important work being, perhaps, the experiments conducted with a view to solving agricultural problems as presented in all parts of the State, though the work of instruction in agriculture and horticulture is of equal value, but more confined in its results. The principal lines of experiments now being worked upon are—

1. The testing of such varieties of grasses and forage plants as can be secured, that give promise of success in the dry, hot climate of New Mexico. While we have an extensive range in this Territory, there is a great lack of suitable pasturage for stock on the ranges and ranches. A summer pasture for cattle is especially needed. Annual grasses, such as the millets, nonsaccharine sorghums, Kaffir and Jerusalem corn, and several varieties of perennial grasses are now under trial. As far as possible, preliminary experiments in the feeding of these crops are being made, but such work can not be satisfactorily done until the college owns its own live stock.

2. Experiments in soil tillage and water management are receiving much attention. In this work the department of soil physics cooperates. The problem to be solved has many phases, and is one of the most important in New Mexico agriculture. It involves the measurement of all water applied to the land, the determination of the moisture content of the soil, the influence of tillage on soil moisture, and kindred subjects. The ultimate object is to determine the least amount of irrigation necessary to secure the highest crop returns. Investigations of this character are cumulative in value, and must necessarily be prolonged over a series

of years. Hay, grain, and orchard crops are being employed in this study, and already interesting and valuable data have been secured. The principal indication noted in the study of an irrigated corn crop is that a deep, loose soil—a condition secured by subsoiling to a depth of 15 to 18 inches—permits the absorption of much more water at each irrigation than is possible in shallow-tilled land, and insures a much more vigorous growth, and, consequently, a better crop.

3. Orchard studies: In the experiment orchard of the college there has been continued this year an experiment begun last year for the destruction of the codling moth. All of the fruit in the orchard was destroyed while very young last year to see if the absence of a food supply would result in the destruction of the pest. During the present season the trees were banded just after the fall of the bloom, and weekly examinations have been made for moths. Compared with other orchards in which the fruit was not destroyed, the college orchard is remarkably free from the codling moth, though not entirely exempt. An experiment in the pruning of the peach is also under way, and studies of the fruiting season, yield, etc., of many varieties of orchard fruits are being made.

4. Feeding experiments with cattle and sheep are planned, and it is hoped may be begun next year. Preliminary to this, an effort has been made this season, both at the college and the substations, to increase the list of possible crops that can be used in stock feeding in New Mexico. It is believed that with alfalfa as a basis a sufficiently varied diet can be provided to yield best results, while the mild climate should aid in making the winter feeding of range stock a profitable industry for the valley ranchmen.

On a smaller scale, experiments and observations with garden crops, ornamental plants, and forest-tree plantations are being conducted. During the year a weekly press bulletin has been sent to the newspapers of the State, and has been very largely used by them. The subjects discussed have been timely and practical, and the bulletin has resulted in an enlarged correspondence for the department coming under this heading, thus proving the interest of the public in the work.

The substations at Roswell, Las Vegas, and Aztec, supported by Territorial appropriations, are designed to aid the home station by undertaking problems of a more local nature. Late in the season they were placed in the care of this department, and while a lack of time prevented the planning of entirely satisfactory work for the present season, it is believed that these substations can be made a source of great value to the communities in which they are located. The great question of the increase of alkali by seepage water will be studied at the Pecos Valley station, and the Aztec station will be largely devoted to experiments with fruit during the immediate future.

The equipment of the department has been materially increased during the year and the prospects for its increased usefulness are bright.

DEPARTMENT OF POLITICAL AND ECONOMIC SCIENCE.

Political economy.—During the year 1899–1900 one course will be given on this subject—an exposition of the general principles of economics. Davenport's Outlines of Economic Theory will be the handbook used, and the subject will be developed in the main by means of assigned readings and oral discussions. Collateral reading on special topics will be assigned to the several members of the class, upon which they will be required to report.

Political science.—Two courses in political science will be given in which the same general method will be followed as in the course in political economy—assigned readings, recitations, and discussions, oral and written, by the class as a whole; and collateral reading, oral and written reports upon special topics, by the members, severally. In the first course—a comparative study of the development of government—Woodrow Wilson's The State will be used as a text-book. In the second course, constitutional law in the United States, Cooley's General Principles of Constitutional Law will probably be retained as a guide book.

DEPARTMENT OF ELOCUTION AND PHYSICAL CULTURE.

Four years ago the department of elocution and physical culture was introduced into the college. Since that time systematic instruction has been given in tone and voice work, articulation, emphasis, inflection, and gesture. All college students are required to take the work, and public recitations by the various students in each class are given yearly.

The class in physical culture, which comprises all of the young ladies of the college, meets every morning at recess in the McFie Hall. Visitors have found it a pleasing sight to watch the fifty or sixty young ladies keeping time to the music

as they go through the graceful movements of the Delsarte drill or the varied changes of the wand and dumb-bell exercises. Instruction is also given in free gymnastics and the Swedish system. Several pleasing entertainments have been given under the direction of the instructor in charge of this department.

DEPARTMENT OF BOTANY, IN CHARGE OF GEOLOGY AND PHYSICS.

College work.—This department has under its charge the work in botany, geology, and physics. The work in each subject occupies the whole year of time, botany having the equivalent of six hours and the others five hours each week.

The method of teaching these subjects pursued is as much the laboratory method as facilities will permit, and it is possible to follow this method almost entirely in the subject of botany.

Students in this subject are supplied with good compound microscopes and all the other necessaries for making a careful microscopic examination of different kinds of vegetable structures. Besides the laboratory work a text-book is used as a guide, and both are supplemented by lectures.

The work in physics consists of lectures with assigned text-book reading and demonstration experiments performed by the teacher and assistant in class. Strictly laboratory physical measurements, except of the simplest kinds, are not possible for want of the necessary apparatus, but it is expected that much of this will be added in the near future.

The work in geology comprises a term in mineralogy and lithology, a term in dynamical and structural geology, and one in historical geology and paleontology. A rather large assortment of minerals is placed in the hands of the students for study and some work in determinative mineralogy is attempted. A small collection of fossils is used in the work in paleontology.

The department has excellent quarters for botanical work in the new science hall, and the work in geology is temporarily placed in one of these rooms until it shall be possible to arrange suitable accommodations for a museum. The physical laboratory, in the engineering building, furnishes good accommodations for this work and will be much better when it is thoroughly equipped for students' laboratory work.

Experiment-station work.—On account of the large amount of teaching in charge of this department not a very great deal of experimental work has been done the past year. A study of the flora is being carried on with the ultimate purpose of publication of a manual of the flora of the Territory, and to this end plants are being collected at all times and preserved in the college herbarium. This herbarium is now of some size and is fairly representative of the flora of the Territory, besides containing some other plants received from different parts of the United States. Some studies of the distribution of plants have been made with the design of making a life-zone map of the Territory.

The summer of 1899 has been spent in the field in the Sacramento Mountains, making collections of plants in localities never before visited by a botanist. The season's trip has yielded between 3,000 and 4,000 specimens of dried plants, of which it is believed that several are new.

The head of this department is particularly anxious to become acquainted with the various investigators in the botanical field of this Territory and offers his services for the identification of plants and the answering of general questions relative to this subject.

DIVISION OF SOIL AND IRRIGATION INVESTIGATION.

This department is cooperating with the Division of Soils and of Irrigation Investigations of the United States Department of Agriculture. The following lines of work are now under way:

First. Measuring the amount of water applied to the experiment-station orchard and to 30 acres of alfalfa near Las Cruces.

Second. A piece of ground on the experimental station farm of about 4 acres was divided into twelve plats and these planted to corn, which has been subjected to different amounts of cultivation. Three of the plats were subsoiled. The soil of each plat has been carefully examined as to its physical characters. In each of these plats were installed two sets of electrodes for determining the amount of moisture in the soil by the electrical method—one at 6 to 9 inches, the other at 21 to 24 inches. Soon after the corn was planted it became impossible to irrigate these plats, and we have therefore gotten some interesting figures on the per cent of moisture in the soil during drought and of the effects of definite quantities of rainfall on soil moisture. We have also learned something of the effect of dust mulch on conserving the soil moisture.

The work for this season will not yield results that can be considered at all conclusive; in fact, the experiments will have to be repeated through a number of years. We hope finally to be able to state with some accuracy the per cent of moisture necessary for the growth of crops and the number of acre-feet of water required to give that necessary moisture.

A month during the summer of 1899 was spent with Messrs. Means and Gardner, of the Division of Soils of the United States Department of Agriculture, in the vicinity of Roswell, studying the soils, alkali, and seepage water. We found the lowland soils there getting into very bad shape from the use of too much water and the leakage from the ditches. The water table had been raised much too near the surface of the soil, and this had caused the accumulation of "alkali" in the surface of the soil to such an extent as to be quite injurious to plant growth. We were able to suggest a remedy for the conditions, which bids fair to relieve the trouble. The lands will have to be thoroughly drained and then flooded during the winter months, and the water will have to be applied judiciously to the growing crops.

Determinations of soil moisture are also being made at the Las Vegas and San Juan substations. We hope that the experience gained this season will enable us to carry out the experiments along these lines on a much larger scale next season. It is exceedingly important that we should know how many acre-feet of water are needed for the different types of soils and different localities of the Territory in order to use economically any water supply that may be made available. It is also very important that we know the characters of the soils of the Territory in order that we may guard against subirrigation and the "alkali" which usually accompanies it.

There are certain localities where irrigation will never be a success without drainage, while in others there seems to be very little need to fear subirrigation, at least so long as irrigation is confined to the lowlands. It is possible that, in all cases where large quantities of water are applied on the mesa lands, there is danger of subirrigating the lowlands.

DEPARTMENT OF SPANISH.

Spanish is optional with Latin in all the courses throughout the freshman and sophomore years; and in the junior year in the scientific course it is optional with higher mathematics and English literature.

Situated, as this college is, near the border of the Republic of Mexico, with Spanish in common use among the majority of our people, the greater number of pupils prefer Spanish to Latin.

For the year ending June 2, 1899, the number of students that studied Spanish was 44; and it is with pleasure that I am able to state that they took an unusual interest in the work.

There exists a strong and growing demand for Spanish-speaking stenographers, and the calls upon this college for competent Spanish and English stenographers during the past year have far exceeded the supply. The work in Spanish is of such a character as to fit the student for commercial work, and a considerable amount of Spanish dictation is given.

In connection with my four Spanish classes I had charge of a class of Spanish-speaking pupils to whom I taught English.

SCHOOL OF STENOGRAPHY AND TYPEWRITING.

In this department provision is made for the thorough and complete training of stenographers and typewriters. The course provided is one year in length, and it is such as to give the student thorough and complete work in those branches best fitted for his needs. The department is well equipped with Remington and Smith Premier typewriters and other facilities, and the training is thorough in every respect.

A special feature of this department, and one which is unique among educational institutions of the country, is the provision made for the training of stenographers in both English and Spanish. This particular feature of the course has been given some attention for several years. The demands made upon this department for competent stenographers in both Spanish and English have been much greater than it has been possible to supply. It is a creditable record for the department that of the many young men and young women who have left this work during the past five years to take active positions not one has been found unable to meet all the requirements expected of him.

DEPARTMENT OF MATHEMATICS AND ASTRONOMY.

Changes in the courses of studies have been made in the various departments of instruction nearly every year in the history of the college. While changes do not always signify growth, still the courses of study have been greatly improved and strengthened. This department will no doubt be greatly benefited by two important changes this year, the raising of the requirements for admission to the freshman class and the lengthening of the recitation period from forty-five minutes to one hour for all college classes. Algebra through logarithms is the mathematical requirement for admission to the freshman class this year, while for several years past the subject had to be completed through quadratics only. More time also is allotted to the above amount of work than has been given heretofore

All freshmen pursue the study of plane and solid geometry daily during the first and second terms, and four days each week during the third term. Before Book I is completed students have practice in solving "original" propositions; and this work is continued throughout the year, requiring at least one-third of the time that is devoted to the study of geometry. The students take pleasure in demonstrating original theorems and in solving original problems, for this is a test of their mastery of the subject.

Trigonometry is taught daily during the first term of the sophomore year. While the greater portion of the time is devoted to the study of plane trigonometry, still the student is able to get a fairly good knowledge of spherical trigonometry.

Higher algebra is taught one hour per week in the third term of the freshman year, and two hours per week in the third term of the sophomore year.

Analytic geometry is taught three hours per week in the third term of the sophomore year, and four hours per week in the first term of the junior year. The work covers not only plane analytic geometry, but also a considerable amount of geometry of three dimensions.

Calculus is taught daily during the second and third terms of the junior year.

All engineering students are required to complete the mathematics as outlined above. All scientific and agricultural students are required to complete the mathematics as far as the end of the second term of the sophomore year. The scientific students may then continue the work as an elective if they desire to do so.

Astronomy is taught five hours per week in the first term of the senior year, four hours per week in the second term, and one hour per week in the third term. This is a required study for all seniors except those in the mechanical engineering course. The class meets for night observations at least once every two weeks throughout the year.

This department has for the use of students a portable equatorial telescope with 4½-inch objective and magnifying powers ranging from 100 to 400, a surveyor's transit with solar attachment, star lantern with slides, planisphere, star atlas, field glasses, and a 24-inch slated globe.

DEPARTMENT OF HISTORY AND PEDAGOGY

The purposes aimed at in teaching history are (1) to give an idea of the great lines of historical development, (2) to discover the ideas which organize historical movements, (3) to stimulate self-directed investigation, (4) to train the judgment in the discrimination of motives and the results of action, and (5) to inspire the student with a desire to be something more and better than a passive observer in the progress of humanity.

The work embraces the following:

General history.—This subject, although required for admission to the freshman class, is taught by the professor of history. It is pursued through the subfreshman year four hours per week. In the limited time allotted, constant effort is made (1) to give the student a large number of important individual facts or events, great care being taken not to burden the memory with unimportant ones; (2) from these to group as many related ones as possible, and thus to connect causes and results of leading historic movements.

History of education.—During the third term of the sophomore year students in the course in pedagogy pursue this subject five hours per week. From a new point of view, this affords a valuable review of many topics passed over in general history, and it is also a fitting introduction to the work in pedagogy, of which it forms a part.

History of civilization.—During the last term of the senior year, five hours per week, students in the course in agriculture, and those of the scientific course who have not elected pedagogy, will pursue this subject.

Pedagogy.—It is not the intention of the board of regents and the faculty to

give this subject great prominence at present. But experience has shown that many of the students of this college engage in teaching to a greater or less extent. It is believed that it is due to these and to the common schools of the Territory, that opportunity should be afforded for obtaining an introduction to the theory and the practice of teaching. To this end, the following elective and substitute work is offered to students of the scientific course.

Elementary psychology.—During the first term of the junior year five hours per week will be devoted to this subject. Disregarding the many fine discriminations properly pertaining to more advanced work, an attempt will be made to make the student familiar with such a popular understanding of mental phenomena as is essential to a study of pedagogy as a science. On the physiological side he will have had ample training in the zoological laboratories.

Arithmetic.—During the third term of the sophomore year, four hours per week, this subject will be thoroughly reviewed from the standpoint of a teacher. Students will not only become very familiar with the subject-matter, but every recitation will be so conducted as to illustrate philosophical method. Students will also be given practice in conducting recitations in this subject.

Language and geography.—During the second term of the junior year five hours per week, in connection with the reading of essential portions of McMury's Method of the Recitation, students will have a training in these subjects, or portions of them, similar to that outlined for arithmetic above.

School management, school law, and practice teaching.—During the third term of the junior year, five hours per week, the time will be divided among these topics in such proportion and in such manner as best judgment may dictate at the time.

General remark.—This course is not intended as a rival to courses given in professional normal schools. So much is introduced to meet partially a pressing demand. Yet, when we take into account the liberal amount of academic training contained in it, especially the scientific training gained through the use of ample equipment in the way of laboratories of various kinds, it is believed that the graduate may enter upon the work of teaching with a reasonable degree of assurance of success.

DEPARTMENT OF ENGLISH AND LATIN.

English.—English is taught throughout the entire collegiate course. The work consists chiefly of theme writing, supplemented by some rhetorical analysis and a careful study of a few English classics. All college students write at least one composition a week.

In the junior year an elective course in English literature is offered. The works read during the current year are two of Shakespeare's plays, Homer's Iliad and Odyssey in a translated form, and Tennyson's Idylls of the King.

Latin.—Latin is taught as an elective during the freshman and sophomore years. Special attention is given to the points of relation, etymological and grammatical, between the English language and the Latin; also to questions of classical mythology and Roman history.

Equipment.—In the department library will be found Smith's Dictionary of Classical Antiquities and Dictionary of Greek and Roman Mythology and Biography, the English dictionaries of Webster and Worcester, and several other books of reference of value to the language student.

DEPARTMENT OF CHEMISTRY.

The work of the chemical department, like that of several other departments of the institution, is divided into two parts—one relating to the instruction of students, and the other to the agricultural experiment station connected with the institution.

The chemical department has been making a steady growth during the short time the college has been in existence. Starting in very poorly arranged and cramped quarters, since moving into the new science building not only the room but the equipment as well has been very materially increased. The equipment of the chemical department is modern and first-class in every particular, and will compare favorably with that of many older institutions. It is not at all necessary for students to leave the Territory to find first-class facilities for instruction in chemistry.

The courses in chemistry and assaying given to students are intended not only as cultural studies of the general college course, but are designed to have a practical application as well. While the institution is comparatively young as yet, it is nevertheless a fact that a number of young men who have taken work in the chemical department are at present holding responsible positions in connection with mining work in Mexico and elsewhere.

In the chemical laboratory of the experiment station a number of investiga-

tions have been carried on that are thought to be of practical value to the Territory. For example, for the past two seasons a study has been made of a number of sections of the Territory in regard to their adaptability to sugar-beet production. As a result of this work, it has been demonstrated that a number of places in the Territory, especially in the northern portion, can produce remarkably high-grade beets, both as to sugar content and purity. A number of people in the Territory have been very much interested in this work, and attempts are being made, in one or two instances with apparently a fair degree of success, to interest capital in the matter and secure the erection of additional sugar factories in the Territory. The principal results that we have secured in the sugar-beet work are to be found in bulletins 26 and 29, which, as well as other bulletins of the station, may be had free upon application.

Bulletins have also been published from this department concerning "The Value of Rio Grande Water for the Purpose of Irrigation," "Alkali in the Rio Grande and Animas Valleys," and "Principles of Stock Feeding and Some New Mexico Feeding Stuffs."

In 1895–1897 investigations were carried on in cooperation with the United States Department of Agriculture, Office of Experiment Stations, concerning the food of our native people, and the composition of our native range cattle. The results of these investigations were published as Bulletins No. 40 and 54 of the United States Department of Agriculture, Office of Experiment Stations. We are also at present cooperating with the Department in the irrigation investigation work, in a study of the composition of the Rio Grande and Pecos river waters.

Besides the above a considerable amount of original research work has been done in this department on methods of analysis of soils, feeding stuffs, etc. Several of these methods have been adopted as official methods by the Association of Official Agricultural Chemists.

DEPARTMENT OF ENTOMOLOGY.

The principal subject studied in the entomological department for some years has been Coccidæ, or the family of scale insects. These insects, though mostly minute and inconspicuous, are very destructive to fruit trees and ornamental plants, and it has become necessary for economic entomologists to give them serious attention. Inasmuch as different kinds are being continually introduced into the United States from abroad, we have had to include in our studies the Coccidæ of the whole world, so far as material could be obtained. The collection of these insects in the college is the most complete in the United States, with the exception of the national collection at Washington, and in it are included the type specimens of a great many new species.

The entomologist has also been much occupied with an investigation of the geographical distribution of the different insects throughout the Territory, with a view to the elucidation of the life zones. It has become apparent in the course of these studies that the life zones of New Mexico are far from being well understood, and while a large mass of data has been accumulated, the work accomplished is small in comparison with that which remains to be done. During the year 1898–99 Prof. C. H. T. Townsend was in charge of this work, and he obtained a large and valuable collection in the Sierra Blanca region, which still awaits study.

The codling moth, so destructive to the apple crop, has been carefully studied, with the result of showing the extreme difficulty by any ordinary means of preventing its ravages. It has several generations during the year in the Mesilla Valley, and thus is able to increase to such an extent that neither spraying nor banding seems to protect the late apples.

The wild bees of New Mexico have been studied for a number of years, and tables for their determination have lately been published. In teaching entomology it was found that there existed no manual or any group of New Mexico insects that could be used by the students, and so it was planned to work up the bees with such a manual in view. The subject proved more interesting and complicated than was expected; several of the genera, and great numbers of the species—over 100 in the Mesilla Valley alone—being undescribed. It has resulted from these and other investigations that the entomologist has published a large number of papers on the natural history of New Mexico, besides the bulletins of the Experiment Station, treating principally of life zones and the codling moth. Papers have appeared in the proceedings of the Philadelphia Academy of Sciences, transactions of the American Entomological Society, bulletins of the scientific laboratories of Denison University, bulletin of the Illinois State Laboratory of Natural History, transactions of the Kansas Academy of Science, Annals and Magazine of Natural History, American Naturalist, Canadian Entomologist, Entomological News, Psyche Botanical Gazette, etc.

The undergraduate classes in entomology in the college have always been small,

and from the nature of the conditions, particularly the lack of time, somewhat unsatisfactory. Better work has been done by senior students preparing theses, taking special subjects, such as the bees of New Mexico, the life of the sand hills, the codling moth, the dacylopinæ, etc. Considerable time has also been given to assisting original research, but with one exception the students have been residents outside of New Mexico, and it has been necessary to correspond through the mails. It is expected in the future that more research students will find their way to the college, and it is hoped that their presence, while not increasing the expenditure to any noticeable extent, will prove beneficial to the institution. During the summer of 1899 the entomologist has conducted the New Mexico biological station at Las Vegas, in cooperation with the normal university, but this station is not at present officially connected with the college.

NEW MEXICO NORMAL UNIVERSITY.

By an act of the Territorial legislature of 1893, the New Mexico Normal School at Las Vegas was created. The proceeds of the special tax levied at that time for the erection of a building, with the addition of $10,000 appropriated by the legislature in 1895, and the sum of $19,700 advanced by the citizens of Las Vegas in 1898, were applied to the erection and equipment of the beautiful brown sandstone building now occupied by the school.

Building.—This building is of the Romanesque style of architecture and is a genuine work of art. It is situated on an eminence in the center of the city of Las Vegas, easy of access from all directions, and surrounded by perfect sanitary conditions. It is heated by steam, perfectly lighted and ventilated, furnished with electric lights, and supplied with mountain water from the Agua Pura Waterworks. The total cost of the building will be about $50,000. It is unquestionably the finest public building in New Mexico and perfectly adapted to the purposes for which it was designed.

Location.—The city of Las Vegas has a population of about 10,000. It is the leading commercial center of New Mexico. It is a thriving business place, situated at the eastern base of the Rocky Mountains, at an elevation of 6,398 feet. The foothills rise from the western side of the city. Only 6 miles away are the famous Las Vegas Hot Springs, and an hour's drive brings one into some of the most beautiful of mountain canyons.

Of all the school and residence towns of the Rocky Mountain region Las Vegas undoubtedly affords the most favorable conditions. As a place for study all the year around it could not be excelled. The winters are mild and pleasant, zero days and cloudy days being rare. The summers are almost perfect. The nights are always cool and the heat of the day rarely touches 90 degrees.

Las Vegas is on the main line of the Atchison, Topeka and Santa Fe Railroad. It is twelve hours by rail from Denver, fifteen hours from El Paso, thirty-nine hours from Chicago, and forty-two hours from Los Angeles. The best of train service makes it easy of access from all directions.

Museum.—Ample room has been set aside for this purpose and every friend of the school is earnestly requested to contribute to this department. New Mexico is rich in geological, botanical, and zoological material, as are all of the Rocky Mountain States; but in the first line of prehistoric interest it stands alone, the richest field on the continent. Large collections are annually leaving the Territory to be placed in Eastern institutions. If centered in New Mexico, these would soon make one of the finest museums of anthropology in existence. The museum of ornithology already comprises 500 specimens.

Sessions.—The institution never closes. It is felt by the manage-

ment that after the State has invested large sums of money in a public institution it should not be closed and yielding no return during any part of the year. Accordingly, continuous sessions are held and students may at all times find profitable courses in instruction in progress.

Moral and spiritual influence.—The school is absolutely free from denominational or sectarian influence. The school accepts the almost universal theory that the chief end of all education is moral character. Accordingly, the character-building aim is kept continually in view.

A high moral sense and a spiritual nature that is fully developed are essential to the teacher to inspire youth to attain higher and nobler lives.

Government.—All government exists for the good of the governed. This conception of government is put into execution in the school. The aim is to develop in pupils the power of self-control, through which the individual comes into perfect obedience to the laws of man and God. The idea is to render discipline unnecessary.

A monthly publication, called the Southwest, devoted to the educational interests of New Mexico and edited by the students of this institution, has already taken a worthy place in school journalism.

Expenses.—Board in private families, $20 to $25 per month. Self-boarding has been conducted by a number of students during the past year at $10 per month.

Fees are as follows: Normal school, $5 for a term of three months; graduate school, $5 for a term of three months; academic school, $5 for a term of three months; manual training school, $5 for a term of three months; commercial school, $15 for a term of three months.

Literary societies.—Two literary societies are in operation, the Delphian, for young women, and the Olympian, for young men. All students are expected to do literary work throughout the course. The reading, elocutionary, oratorical, and dramatic work will all be prepared under the direction and training of a critic Joint open meetings are given each term, and an annual contest will be held. To cultivate the power of the voice and attain ease and power in public speaking are the aims of the literary societies.

Gymnasium.—Systematic gymnasium work will be given through the year, and field athletics under careful training will be a permanent feature. The athletic interests are under the general supervision of the physical directors of the athletic association. All exercises that furnish wholesome and enjoyable physical recreation will be cultivated. An annual field day, with contests, will be held. A well-equipped gymnasium is in process of development, and it is hoped that a permanent athletic field may be secured during the coming year.

Library.—The library has come to be an indispensable department of an educational institution. It is a constant source of inspiration and culture to both student and faculty. Each department is furnished with its own special library, and the general reading room is being supplied as rapidly as funds will permit. It contains the best reference books, history, biology, science, poetry, fiction, psychology, and philosophy, a good supply of current magazines, and nearly all of the Territorial magazines and newspapers are kept on file through the courtesy of the proprietors.

Business correspondence.—A very large amount of business correspondence is done by the student during his course, in which he learns model forms of business letters of every kind. Shorthand, commercial arithmetic, penmanship, and rapid calculation, commercial law,

and other branches are taught thoroughly. Altogether, this university is a credit to New Mexico, as it would be to any of the Eastern States. The faculty consists of teachers well trained for their work, and this school is rapidly forging to the front as one of the finest higher educational institutions to be found anywhere, and it is only a matter of a short time when it will be known, by the work it has accomplished, as one of the best educational institutions in the West.

NEW MEXICO NORMAL SCHOOL AT SILVER CITY.

The normal school of New Mexico, located at Silver City, designed to furnish the Commonwealth with competent teachers, was established by act of the Territorial legislature of 1893. In obedience to this act, its organization was perfected the following year by the election of a competent faculty and the adoption of a suitable course of study. While the permanent building was in process of construction, temporary quarters were secured for the accommodation of students. The new edifice, a structure well suited for school purposes and supplied with modern appliances, was dedicated with appropriate ceremonies in October, 1896. The third story has been completed.

This normal school has just completed the fifth year of its existence, with brighter prospects than any before since its creation. Its growth along all lines has been steady and substantial. In numbers, in organization, and in popularity with its patrons it has achieved all that is reasonable to expect from so young an institution.

Since making our last report the board of regents has, as above stated, completed the third story of the normal building, and has seated the assembly hall with opera chairs, and made such other improvements as their finances would permit. From funds arising from entertainments and other incidental sources considerable apparatus has been purchased and the number of books in the library greatly increased.

The number enrolled during the year 1899 was seventy-nine, and the average daily attendance of the current year indicates an increase over that of the last. The number graduated at the June commencement was seven, all of which were from the professional department.

To show that the normal has been fulfilling the purpose for which it was created, we call attention to the occupations of its alumni. Four classes, numbering twenty-five in all, have been graduated. Of these, three young ladies have married; four are students in higher institutions; fifteen are engaged in the teaching profession, and three are engaged in other occupations.

The financial aid received from the tax levy is, doubtless, the same as that of the other institutions, with the exception of the university located at Albuquerque. This has been most judiciously expended for teachers' wages and incidental expenses. That the amount received is not sufficient to maintain a school of the highest character is generally understood, and that this amount is inadequate to meet the expenses is best known only by those who administer its affairs. As an institution grows it should receive an amount commensurate with its development. Owing to the competency of the teaching force of the normal, however, we are doing a work equal to that of any other institution of a similar character in the West; hence we earnestly hope that the coming session of the legislature will deal with us as we merit.

The school maintains three departments of instruction: (1) Professional, (2) academic, and (3) business. The first entitles the graduate

to a life certificate to teach in the public schools of New Mexico. The second comprehends those studies embraced in the term "secondary education." The third aims to fit the student to meet the demands of actual business life. The friendly relations established between the city schools and the normal has led to such an articulation as makes each mutually helpful, the former serving the purposes of a training school for the artisan teacher. The term begins September 1 and continues forty weeks.

It is the established policy of the board of regents to conform strictly to the law, administer duties in conformity to business principles, and exercise the strictest economy consistent with the demands of the school. The school needs increased funds for its maintainance and a dormitory for the accommodation of its students. We labor under the belief that the people of the Territory will recognize the merits of the normal school and the place it occupies in our educational system, and will supply its needs. This school has done remarkably good work, and with increased funds would be in a position to do much more in the future.

PUEBLO AND JICARILLA AGENCY,
Santa Fe, N. Mex., August 10, 1899.

SIR: I have the honor to submit the following report of the operations of this office for the fiscal year ending June 30, 1899:

PUEBLOS.

Population.—A partial census taken at the close of the fiscal year is transmitted herewith. It was found impossible to take a census at Acoma, Pahuate, San Felipe, San Ildefonso, Santa Ana, Santo Domingo, Tesuque, or Zuni, and the census obtained from Isleta was incomplete. However, I succeeded in obtaining statistics showing population of all pueblos except Santa Ana, at which place there is no Government employee, and it was found impossible to secure the desired information without incurring expense.

The statistics called for in office letter of June 17, 1899, are as follows:

Number of males above 18 years of age	2,498
Number of females above 14 years of age	2,325
Number of school children between the ages of 6 and 16	2,112
Number of school children attending school	1,102
Number of school children not attending school	1,010

While these statistics are in several cases estimates, they will be found approximately correct.

The population by pueblos is as follows:

Acoma (including Acomita)	1,376
Cochiti	355
Isleta	1,000
Jemez	456
Laguna (Laguna proper)	292
Pahuate (subpueblo of Laguna)	375
Paraje, Casa Blanca, and Santana (subpueblos of Laguna)	183
Nambe	98
Picuris	96
Sandia	77
San Felipe	650
San Ildefonso	150
San Juan	378
Santa Ana	300
Santa Clara	248
Santo Domingo	1,015
Taos	402
Tesuque	84
Zia	104
Zuni (including Ojo Caliente, Nutria, and Poscado)	1,422
Total	8,961

Farm products.—The scattered condition of the Indians renders it impossible to gather statistics of farm produce which can be considered anything more than approximate, but estimates have been prepared by the various teachers showing as nearly as could be ascertained the quantities raised. Crops reported as follows:

Wheat	bushels	65,352
Oats	do	2,682
Corn	do	58,802
Potatoes	do	25
Turnips	do	25
Onions	do	7,295
Beans	do	25,053
Other vegetables	do	1,516
Melons	number	63,000
Pumpkins	do	14,900
Hay, cut	tons	793½

The pueblo of Isleta is so situated that it was impossible for the teacher there to give an estimate which would be satisfactory to himself, consequently this pueblo is not included in the above.

Methods of farming.—These in most cases are of the crudest, and are the same which have been in vogue for the past two hundred years. While the Indians are ready to make use of modern improvements when the same are offered them, they are not sufficiently cognizant of the advantages offered thereby to provide themselves with them. Nowhere can crops be raised without irrigation, which renders agriculture more arduous than in more favored sections of the country. The pueblos ditches and system of irrigation are fully equal to those of any of their neighbors, or in fact to any open-ditch system in use. It is in harvesting and thrashing their grain that the most antiquated methods prevail, wheat and oats being harvested with the old reaping hook which has been in use for thousands of years. Thrashing is done on a thrashing floor in precisely the same manner as among the peoples of three thousand years ago, viz, by driving animals over it until the grain is tramped out of the straw. In the process it becomes mixed with all manner of foreign substances, which have to be picked out with the fingers or washed in water from a ditch. It is needless to say that grain thrashed in this manner will not bring as good price on the market as it should. Even while having to contend with such discouragements several of the pueblos raise grain for market. If they were furnished with a few thrashing machines, one of which could be used by several pueblos, they would be enabled to make far larger profits on their grain and would raise more for market, thus enabling them to overcome their extreme poverty and advance in civilization.

Farmers.—During the year farmers have been appointed at Zuni and at Jemez. Although but a few months have elapsed since these employees were assigned to duty the beneficial results are already apparent.

Arts, etc.—The Pueblo Indians have always been noted for their proficiency in making pottery. The pottery produced is very beautiful, but it is also very fragile and can not be shipped without the greatest care in packing. This results from the method of manufacture. The dirt is made into a soft mud and pressed into the desired shape with the hands, after which it is dried in the sun. When it has become sufficiently hardened it is polished by rubbing with the palm of the hand and painted in various fantastic designs, after which it is burned in a slow fire kindled in the open air. All of the pueblos make more or less pottery, and each pueblo has its distinctive designs.

Weaving is also carried on to some extent in a few of the pueblos.

Schools.—There are now seventeen day schools in this agency, three having been organized during the past year. The attendance has been exceedingly good, as shown by the following:

Statement of attendance at schools of the Pueblo and Jicarilla Agency, N. Mex., for the year ending June 30, 1899, as compared with the year ending June 30, 1898.

School.	Average attendance.		Increase.	Decrease.
	1898.	1899.		
			Per cent.	*Per cent.*
Acoma	6.69	20.39	305	
Cochiti	11.73	15.99	36	
Isleta	16.52	30.09	22	
Jemez	26.43	26.71	9	
Laguna	15.78	31.06	33	
Nambe		16.93		
Pahuate	12.07	14.10	10	
Paraje		28.55		
Picuris		12.66		
San Felipe	17.57	25.55	44	
San Ildefonso	17.34	35.69	106	
San Juan	16.69	18.15		2
Santa Clara	14.36	19.61	37	
Santo Domingo	14.26	20.24	41	
Taos	34.92	34.39	38	
Zia	24.07	36.25	52	
Zuni	40.69	42.24	5	
Total	261.32	410.48		

Net increase agency schools for year, 57 per cent.

Most of the buildings are still in a very bad condition, though they show improvement over last year in some instances. Deeds to school sites have been secured at Nambe and Zia, and deeds have been promised at San Felipe and San Ildefonso, at which four places steps are now being taken to erect new school buildings costing from $1,000 to $1,500.

All the schools are now fairly well seated, nearly 200 double desks having been sent out during the year.

The work of the teachers has been of excellent character, in most cases showing a great amount of tact and interest in filling the schools to their utmost capacity, some of them showing an average attendance greatly in excess of the number which can be properly accommodated in the buildings.

During the year about 200 children have been sent from among the pueblos to the nonreservation schools at Santa Fe and Albuquerque, who, with the 742 children in the day schools and others in the contract and denominational schools, as well as those who were previously attending these nonreservation schools, brings up the total of 1,102 children now under educational influence.

Below is a detailed account of each of the day schools:

Acoma.—This school has shown great progress, especially in March and April, when the capacity of the building was taxed. The teacher, Miss Cora A. Taylor, has done her duty well. The industrial work and kindergarten work deserve especial mention. The girls have been taught to make their own clothing and show much skill in the work.

Cochiti.—As this pueblo was visited with two lingering epidemics during the year the school has not done as well as some others, but it has done wonderfully well considering the conditions. Nearly every month has shown an increase in attendance in spite of all difficulties. Mrs. J. B. Grozier, the teacher, has worked incessantly with the sick and has been a mother to the entire pueblo as well as to the school.

Isleta.—This school, while showing some progress during the winter, is not quite as satisfactory as it should be. The attendance for the winter months was good, but the spring months showed quite a decrease. The work of the teacher, Mr. James Hovey, is fairly good.

Jemez.—This is one of the best schools in the agency. The attendance is quite large, owing to the noonday lunch given here. The capacity of the building is severely taxed, and were there facilities a much larger attendance could be secured. Miss Emma Dawson, the teacher, has shown much tact, good judgment, energy, and executive ability in the discharge of her duties.

Laguna.—The school here was closed for several weeks on account of the smallpox, during which time the teacher, Mrs. Annie M. Sayre, worked heroically nursing the sick and caring for their wants. The death list would have been much larger but for her efforts.

The present teacher, Miss Margaret A. Bingham, is faithful and competent. She has increased the attendance largely since going to Laguna.

Nambe.—This school is one of our best in discipline, order, and method. All the children in the village are enrolled. The kindergarten work is exceptionally good. There is nothing but commendation to say of Miss Lampson and her school.

Pahuate.—This school, up to April 30, while under charge of Miss Annie H. Nichols, showed good progress both in attendance and school work.

Paraje.—This school was started May 1 and is proving most successful. Miss Fannie J. Dennis, formerly matron at the Zuni school, was promoted to the position of teacher here and has demonstrated that confidence was not misplaced in thus promoting her. Her school is progressive and fully up to the standard.

Picuris.—This is another new school started last April. During the short time it has been in session the teacher has had excellent success, and the attendance has been good considering the size of the pueblo. While this school can never be very large it gives promise to be among the most successful in character of work.

San Felipe.—During the early part of the year this school showed a decrease in its attendance, but this was compensated for by a large increase during the winter months. Mr. Taber and wife were hard-working and conscientious employees, and this good showing was largely due to their efforts.

San Ildefonso.—The showing made at this place has been almost phenomenal. With a school building having a capacity for 21 pupils and a scholastic population of 43, 7 of whom were in attendance at the nonreservation school at Santa Fe for a large part of the year, the year's average attendance was 35.69. Too much praise can not be given the teacher, Miss Anna H. Turner, for her energetic and persistent efforts in filling up the school and in keeping pupils in school who have once entered.

San Juan.—This school is further advanced than any other day school in the agency. Mr. Felipe Valdez is a faithful, capable teacher and a young man of sterling character. His school is remarkably well advanced, of good manners and breeding. Mr. Vlades plays the violin, using it for sacred and school music, much to the advantage of the school.

The children here sing nicely, enunciating as clearly as white children of the same grade. The comparative statement shows a slight decrease in average attendance, but this is fully accounted for by the large number who have entered the nonreservation schools from this pueblo during the past year. There are now more than 50 children from San Juan in attendance at Government and denominational boarding schools.

Santa Clara.—Under the charge of Mr. W. C. B. Biddle this school has made much progress during the year, showing a steady increase of attendance. His methods of teaching are good and results entirely satisfactory.

Santo Domingo.—The school here consists entirely of boys, but is doing fairly well. Mr. Holsinger has had greater difficulties to contend with than any other teacher in the agency, but he has succeeded in making his school compare favorably with the others. He is a faithful and conscientious worker and deserves great credit for what he has done.

Taos.—The Taos school is one of our largest, the attendance running from 85 to 46. The work of the teacher, Mrs. Alice C. Dwire, is entirely satisfactory. She has shown marked ability in handling so many ungraded pupils and at the same time teaching industrial work to the women of the village, besides caring for the numerous and ever-present sick.

Zia.—This school was in charge of Miss Margaret A. Bingham the first part of the year, but later was turned over to Mrs. Annie M. Sayre, of Laguna. It has made uniform progress, and on account of several attending who are past school age the average attendance for the year exceeds the scholastic population. The buildings are a disgrace to the service, but the school is a credit to both teachers.

Zuni.—The Zuni school had a very hard experience this year, but in spite of the terrible scourge which swept over the pueblo the school shows an increase in attendance. When it was reopened, about the middle of February, nearly all the children were in a very weak condition, resulting from the disease from which they were just recovering, which rendered much school work impossible for some time. The teachers, too, were utterly exhausted with their excessive duties in nursing the smallpox. I desire to emphasize the fact that it is impossible for employees in the Indian service to show more sacrifice, more heroism than did the employees of the Zuni school. Working from early morning till late at night, visiting smallpox patients, climbing ladders and descending into the polluted and filthy atmosphere of Indian homes with as many as seven infected

patients lying on the floor of the room, relieving the sufferings of the living, and attending to the last offices for the dead, takes no common devotion to duty. History may not record these heroines, but any positions which these employees can fill to which they can be promoted will be but simple justice to them.

New schools.—New schools have been asked for at Tesuque, Santa Ana, Ojo Caliente, Nutria, and Poscado, the last three being outlying villages belonging to the Zuni pueblo. Experience has shown that wherever the Indians themselves request a school, as they have done at each of these places, it is a success when established, and I have no doubt these will prove no exceptions.

In addition to the schools which depend directly upon this agency there is a contract boarding school at Bernalillo, N. Mex., which is doing excellent work. The rooms, buildings, and premises generally are kept neat and clean and in first-class condition. A school garden is kept where the children are taught modern methods of raising vegetables and various kinds of industrial work. I can not say too much in praise of the effectiveness of this school.

Housekeepers and noonday lunches.—The appointment of a housekeeper at San Felipe and the noonday lunches which were authorized at that and several other schools have proved a decided success in increasing the attendance, and the system should be maintained and extended.

In general, I wish to say that the excellent showing made by all the schools for the past year has been due to the earnest and persistent efforts of each employee of this office, and the credit belongs to all.

Missionaries.—The missionaries of the Dutch Reform Church, Mr. A. Vanderwagon and wife, are supported at Zuni. Dr. C. E. Lukens is a medical missionary at Laguna, supported by the Presbyterian Church, and is doing a good work among the Indians. He rendered valuable service in fighting the smallpox and relieving the sick from other diseases.

Two teachers who conduct a school at Soama, a village of Indians lying between Laguna and Acoma, are also supported by the Presbyterian Church, and are doing very successful work.

In the St. Catherine's Indian School of this city, conducted by the Sisters of the Blessed Sacrament, about 100 Indian children are taught and cared for each year. Among the progressive Indians at the pueblos near Santa Fe are found the returned students from this school.

Health.—During the first four months of the fiscal year almost all the pueblos were severely afflicted with malaria, in most cases evidently caused by the bad water supply. This was especially true of the pueblos of Cochiti and Sandia where the disease was the worst. At Sandia during the month of August there were five deaths in twenty-one days, although it is a small pueblo of less than 100 inhabitants. It was found that the disease was caused by drinking stagnant water from an irrigating ditch. This condition has been remedied by the purchase of a pump and placing same in a well dug by the Indians themselves, thus insuring them in future an abundant supply of pure water for drinking purposes. At Cochiti the malaria was more virulent and persistent, about thirty dying and the sickness continuing until the middle of November. A well has been authorized, and when completed will greatly diminish the danger of such scourges in future. A few cases of what appeared to be cerebro-spinal meningitis appeared during the latter part of October, but the disease did not become epidemic.

When I took charge of the agency, July 1, 1898, I found that the smallpox which had been raging at Isleta for the past six months had about run its course at that pueblo, and very soon after my taking charge it entirely disappeared therefrom. During the months of June, July, and August it had reached the pueblos of Sandia and Santa Ana. During the latter part of August the disease obtained a foothold in the large and scattered pueblos of Acoma and Laguna and their outlying villages. The school at Acoma was closed from September 25 to October 10, when conditions had improved sufficiently to warrant reopening. The teacher at Pahuate requested authority to close, but before same reached her a change for the better rendered it unnecessary. At Laguna the school was closed October 17 and so remained until December 13. The teacher at Cochiti reported smallpox November 5, and it remained in this pueblo until February 10, causing twenty deaths. At Jemez the first appearance was October 26, after which time it spread slowly for a while, there being only sixteen cases December 2. By December 19 the number had increased to sixty cases and school was closed. However, it was reopened January 2, the teacher thinking that she could be better able to protect the children from infection if they were in school than if they were taken care of themselves in the village under no restraint whatever. Fifty-seven died here before the disease ran its course.

The first case was reported from the large pueblo of Zuni on November 13,

The present teacher, Miss Margaret A. Bingham, is faithful and competent. She has increased the attendance largely since going to Laguna.

Nambe.—This school is one of our best in discipline, order, and method. All the children in the village are enrolled. The kindergarten work is exceptionally good. There is nothing but commendation to say of Miss Lampson and her school.

Pahuate.—This school, up to April 30, while under charge of Miss Annie H. Nichols, showed good progress both in attendance and school work.

Paraje.—This school was started May 1 and is proving most successful. Miss Fannie J. Dennis, formerly matron at the Zuni school, was promoted to the position of teacher here and has demonstrated that confidence was not misplaced in thus promoting her. Her school is progressive and fully up to the standard.

Picuris.—This is another new school started last April. During the short time it has been in session the teacher has had excellent success, and the attendance has been good considering the size of the pueblo. While this school can never be very large it gives promise to be among the most successful in character of work.

San Felipe.—During the early part of the year this school showed a decrease in its attendance, but this was compensated for by a large increase during the winter months. Mr. Taber and wife were hard-working and conscientious employees, and this good showing was largely due to their efforts.

San Ildefonso.—The showing made at this place has been almost phenomenal. With a school building having a capacity for 21 pupils and a scholastic population of 43, 7 of whom were in attendance at the nonreservation school at Santa Fe for a large part of the year, the year's average attendance was 35.69. Too much praise can not be given the teacher, Miss Anna H. Turner, for her energetic and persistent efforts in filling up the school and in keeping pupils in school who have once entered.

San Juan.—This school is further advanced than any other day school in the agency. Mr. Felipe Valdez is a faithful, capable teacher and a young man of sterling character. His school is remarkably well advanced, of good manners and breeding. Mr. Vlades plays the violin, using it for sacred and school music, much to the advantage of the school.

The children here sing nicely, enunciating as clearly as white children of the same grade. The comparative statement shows a slight decrease in average attendance, but this is fully accounted for by the large number who have entered the nonreservation schools from this pueblo during the past year. There are now more than 50 children from San Juan in attendance at Government and denominational boarding schools.

Santa Clara.—Under the charge of Mr. W. C. B. Biddle this school has made much progress during the year, showing a steady increase of attendance. His methods of teaching are good and results entirely satisfactory.

Santo Domingo.—The school here consists entirely of boys, but is doing fairly well. Mr. Holsinger has had greater difficulties to contend with than any other teacher in the agency, but he has succeeded in making his school compare favorably with the others. He is a faithful and conscientious worker and deserves great credit for what he has done.

Taos.—The Taos school is one of our largest, the attendance running from 35 to 46. The work of the teacher, Mrs. Alice C. Dwire, is entirely satisfactory. She has shown marked ability in handling so many ungraded pupils and at the same time teaching industrial work to the women of the village, besides caring for the numerous and ever-present sick.

Zia.—This school was in charge of Miss Margaret A. Bingham the first part of the year, but later was turned over to Mrs. Annie M. Sayre, of Laguna. It has made uniform progress, and on account of several attending who are past school age the average attendance for the year exceeds the scholastic population. The buildings are a disgrace to the service, but the school is a credit to both teachers.

Zuni.—The Zuni school had a very hard experience this year, but in spite of the terrible scourge which swept over the pueblo the school shows an increase in attendance. When it was reopened, about the middle of February, nearly all the children were in a very weak condition, resulting from the disease from which they were just recovering, which rendered much school work impossible for some time. The teachers, too, were utterly exhausted with their excessive duties in nursing the smallpox. I desire to emphasize the fact that it is impossible for employees in the Indian service to show more sacrifice, more heroism than did the employees of the Zuni school. Working from early morning till late at night, visiting smallpox patients, climbing ladders and descending into the polluted and filthy atmosphere of Indian homes with as many as seven infected

patients lying on the floor of the room, relieving the sufferings of the living, and attending to the last offices for the dead, takes no common devotion to duty. History may not record these heroines, but any positions which these employees can fill to which they can be promoted will be but simple justice to them.

New schools.—New schools have been asked for at Tesuque, Santa Ana, Ojo Caliente, Nutria, and Poscado, the last three being outlying villages belonging to the Zuni pueblo. Experience has shown that wherever the Indians themselves request a school, as they have done at each of these places, it is a success when established, and I have no doubt these will prove no exceptions.

In addition to the schools which depend directly upon this agency there is a contract boarding school at Bernalillo, N. Mex., which is doing excellent work. The rooms, buildings, and premises generally are kept neat and clean and in first-class condition. A school garden is kept where the children are taught modern methods of raising vegetables and various kinds of industrial work. I can not say too much in praise of the effectiveness of this school.

Housekeepers and noonday lunches.—The appointment of a housekeeper at San Felipe and the noonday lunches which were authorized at that and several other schools have proved a decided success in increasing the attendance, and the system should be maintained and extended.

In general, I wish to say that the excellent showing made by all the schools for the past year has been due to the earnest and persistent efforts of each employee of this office, and the credit belongs to all.

Missionaries.—The missionaries of the Dutch Reform Church, Mr. A. Vanderwagon and wife, are supported at Zuni. Dr. C. E. Lukens is a medical missionary at Laguna, supported by the Presbyterian Church, and is doing a good work among the Indians. He rendered valuable service in fighting the smallpox and relieving the sick from other diseases.

Two teachers who conduct a school at Soama, a village of Indians lying between Laguna and Acoma, are also supported by the Presbyterian Church, and are doing very successful work.

In the St. Catherine's Indian School of this city, conducted by the Sisters of the Blessed Sacrament, about 100 Indian children are taught and cared for each year. Among the progressive Indians at the pueblos near Santa Fe are found the returned students from this school.

Health.—During the first four months of the fiscal year almost all the pueblos were severely afflicted with malaria, in most cases evidently caused by the bad water supply. This was especially true of the pueblos of Cochiti and Sandia where the disease was the worst. At Sandia during the month of August there were five deaths in twenty-one days, although it is a small pueblo of less than 100 inhabitants. It was found that the disease was caused by drinking stagnant water from an irrigating ditch. This condition has been remedied by the purchase of a pump and placing same in a well dug by the Indians themselves, thus insuring them in future an abundant supply of pure water for drinking purposes. At Cochiti the malaria was more virulent and persistent, about thirty dying and the sickness continuing until the middle of November. A well has been authorized, and when completed will greatly diminish the danger of such scourges in future. A few cases of what appeared to be cerebro-spinal meningitis appeared during the latter part of October, but the disease did not become epidemic.

When I took charge of the agency, July 1, 1898, I found that the smallpox which had been raging at Isleta for the past six months had about run its course at that pueblo, and very soon after my taking charge it entirely disappeared therefrom. During the months of June, July, and August it had reached the pueblos of Sandia and Santa Ana. During the latter part of August the disease obtained a foothold in the large and scattered pueblos of Acoma and Laguna and their outlying villages. The school at Acoma was closed from September 25 to October 10, when conditions had improved sufficiently to warrant reopening. The teacher at Pahuate requested authority to close, but before same reached her a change for the better rendered it unnecessary. At Laguna the school was closed October 17 and so remained until December 13. The teacher at Cochiti reported smallpox November 5, and it remained in this pueblo until February 10, causing twenty deaths. At Jemez the first appearance was October 26, after which time it spread slowly for a while, there being only sixteen cases December 2. By December 19 the number had increased to sixty cases and school was closed. However, it was reopened January 2, the teacher thinking that she could be better able to protect the children from infection if they were in school than if they were taken care of themselves in the village under no restraint whatever. Fifty-seven died here before the disease ran its course.

The first case was reported from the large pueblo of Zuni on November 1?

though this pueblo had been threatened for several months. Both myself and the governor of the pueblo gave strict orders that no one should visit the pueblos afflicted, but one man disobeyed these orders and visited the pueblo of Acoma during some of their festivities, where he contracted the disease and carried it to his home. Upon receipt of notice that there was a case in Zuni I immediately telegraphed for fresh vaccine points and sent the supervising teacher there with full power to take such measures as might be necessary to stop the spread of the plague. He endeavored to quarantine the case, but the mischief had already been done and the disease spread with frightful rapidity, causing many deaths. It was not finally eradicated until March 9.

During the month of February there were twelve cases and one death at San Felipe, and fifteen cases and three deaths at Santo Domingo, but the disease did not gain much of a foothold, these two pueblos having been thoroughly vaccinated in January before the appearance of the scourge.

Later in the year one case appeared at San Ildefonso, two at Santa Clara, and one at San Juan. No deaths at either point.

The whole history of this epidemic proves that the responsibility rests with the utter worthlessness of the vaccine points furnished to this agency. Smallpox was first reported in this agency in December, 1897, by Captain Nordstrom, who was then Indian agent. He received and distributed, with instructions to use, 3,000 vaccine points immediately. Nearly all were actually so used. Later Captain Cooper, successor to Captain Nordstrom, distributed 5,000 more points throughout the agency. Captain Cooper also employed a physician to vaccinate all the Indians of the pueblos of Jemez and Zia. He used fresh vaccine points but there were very few "takes," and nearly all those considered as "takes" were very slight. That this vaccination was ineffectual is shown by the fifty-seven deaths reported above.

On August 17 I received notice that the pueblo of Zuni was threatened with smallpox. I immediately telegraphed for vaccine points, and on August 22 I mailed to Zuni 200 points received in response to my telegram. Again, on December 12, I mailed to Zuni 400 points that day received. Nearly a thousand vaccinations were made with these two consignments of points, with only a few cases taking. While Jemez and Zuni were the most utter failures, vaccination with these points was not successful in a single pueblo.

In response to an inquiry from the honorable Commissioner of Indian Affairs, relative to the efficiency of the points, I wrote the following letter:

PUEBLO OF JICARILLA AGENCY,
Santa Fe, N. Mex., January 26, 1899.

SIR: Referring to office letter of January 23, 1899, finance, 58096–98, 1435–99, I have the honor to state that whatever may have been the quality of the vaccine points when sent out by the vaccine establishment, they were worthless when received in this office. If they were subjected to too much heat or light, it was in the mails and not in this office. The points were used time and again upon employees of this office immediately upon receipt with no effect whatever. Time and again the points were mailed to different places and used in vaccinating Indians within five days after the date when they were said to be charged, but without effect. These points were used before they had time to be subjected to light or heat, and during the very few hours when it was necessary for them to be kept in this office they were kept in a cool place as directed.

My complaint is not about any special delivery of points; but points have been sent to this agency at least six times since I have been in charge, and they have not been satisfactory in a single instance.

Very respectfully,

N. S. WALPOLE,
United States Indian Agent.

COMMISSIONER OF INDIAN AFFAIRS,
Washington, D. C.

I had several times stated that points received were unsatisfactory, but had not given particulars, which gave rise to the inquiry above referred to.

As soon as smallpox was reported in a pueblo, I addressed a letter to the governor warning him of the danger of the spread of the disease and giving instruction how to maintain a quarantine. On October 26 I was in the pueblo of Zuni, and hearing that there would be a fiesta at Acoma in a few days, I called the attention of the Indians in council assembled to the fact that smallpox existed in that pueblo and instructed them not to go to Acoma. The governor also forbid all his people going. One man disobeyed orders and was taken sick about the middle of November and the night before the occurrence of the "shalake," the great reli-

gious dance of the Zunis. His house was used by one of the clans as headquarters, the report having been circulated and believed by the Indians that it was not smallpox but chickenpox with which the man was afflicted. In this way all Zuni was exposed before preventive measures could be taken, or a quarantine established.

The scourge having spread to three pueblos which had previously escaped, on November 19 I addressed the following letter to each of the governors of pueblos under this agency:

PUEBLO AND JICARILLA AGENCY,
Santa Fe, N. Mex., November 19, 1898.

SIRS: Smallpox is spreading to such an alarming extent among the pueblos that you are instructed not to let a single person of your pueblo visit another Indian pueblo. This order must be obeyed. Any Indian found visiting another pueblo without authority from this office will be arrested and jailed by the local authorities and sheriffs, for the reason that the smallpox virus is carried from place to place in the clothing.

Very respectfully,

N. S. WALPOLE,
United States Indian Agent.

THE GOVERNORS OF THE VARIOUS PUEBLOS.
(Care Teacher Indian School.)

On the same day I wrote as follows to Mr. Charles N. Burton, supervising teacher:

PUEBLO AND JICARILLA AGENCY,
Santa Fe, N. Mex., August 19, 1898.

SIR: We have a letter, dated November 16, from Miss Elmira R. Greason, principal teacher at Zuni, stating that there is one case of smallpox at Zuni pueblo. You will please leave Santa Fe for Zuni this afternoon, and make a thorough investigation regarding the smallpox, and if found as represented you will proceed at once to quarantine and to take all other necessary steps to prevent the spread of same. Also instruct Miss Faurete, field matron Zuni Reservation, to see that the various Indians live up to your instructions. We have instructed Miss Greason to work in harmony with you and to follow your advice strictly. Would suggest that you remain at Zuni at least three or four days.

Upon your return to Santa Fe please investigate Laguna, Pahuate, and Acoma, provided you find it safe to do so.

Very respectfully,

N. S. WALPOLE,
United States Indian Agent.

MR. CHARLES N. BURTON,
Supervising Teacher, Santa Fe, N. Mex.

I also sent the following letter to the governor of Zuñi Pueblo:

PUEBLO AND JICARILLA AGENCY,
Santa Fe, N. Mex., November 19, 1898.

SIR: Having heard that there is a case of smallpox at Zuñi, I desire to inform you that Mr. Charles E. Burton, supervising teacher, will go to your pueblo at once to look after the situation there. You will please give him every assistance in your power and cooperate with him in every possible way. I further desire that you give attention to his suggestions and do everything in your power to carry them into effect. This is very important, as by this means you will be enabled to prevent the spread of the disease, and thereby save the lives of many of your pueblo, while if the disease is allowed to spread it is probable that hundreds of the Zuñi people will die from the effects of the disease. I desire very much to save your people's lives and do everything to guard their health.

Very respectfully,

N. S. WALPOLE,
United States Indian Agent.

GOVERNOR OF ZUÑI PUEBLO,
Zuñi, N. Mex.
(Care Miss Elmira R. Greason.)

Mr. Burton remained in Zuñi ten days, at the end of which time everything appeared to be safe; but a day or two after his departure several new cases appeared.

All the employees at Zuñi did everything in their power to relieve the suffering, but owing to a suspension of mail facilities no word was received from Zuñi from

the middle of December until January 4, during which time the plague spread most rapidly, and hearing nothing it was supposed that everything was progressing satisfactorily. On January 4 I requested authority to eradicate smallpox. I also ordered several vaccine "crusts" from a reliable vaccine farm, and immediately upon their receipt sent Dr. David Knapp to Zuñi, with full power and authority to take such steps as might seem proper to stamp out the disease. On February 21 he returned to Santa Fe, having succeeded in stamping out the disease.

The disease having spread throughout the Territory, and experience having proven the inefficiency of previous vaccinations, on January 14 I addressed the following letter to the honorable Commissioner of Indian Affairs:

PUEBLO AND JICARILLA AGENCY,
Santa Fe, N. Mex., January 14, 1899.

SIR: I have the honor to request authority to purchase twenty-five vaccine crusts at an expense of $50, and to expend not exceeding $375 to employ physicians to vaccinate all the Pueblo Indians of this agency. These physicians are to be employed as follows:

One for the pueblos of Taos and Picuris, $50.
One for Laguna, Acoma, Pahuate, and Isleta, $100.
One for Santa Ana, Santo Domingo, San Felipe, and Cochiti, $100.
One for San Juan, Santa Clara, and San Ildefonso, $75.
One for Nambe and Tesuque, $50.

It is necessary to have this vaccination done at once, or a great per cent of the Indian population will be swept away within the next few weeks. From an economical standpoint it might be best to have Dr. Fouts, from the Jicarilla subagency, to come down and do the work, but before one physician could vaccinate several thousand Indians, many would have contracted the disease.

The vaccine points that have been used heretofore have proven so utterly worthless that I have asked the authority to purchase the vaccine crusts that are used here with perfect success. One thousand were vaccinated at Zuñi with the points with very few good "takes." The same is true of the thousands vaccinated at the various other pueblos. The necessary precautions were taken before this epidemic broke out, but as the points were not good no results were obtained. The faith of the Indians has been destroyed to a great extent by the failure of vaccination to protect them from the disease.

The Mexican towns near the Indian towns where I wish this work to be done are infested with the disease, and unless extreme precautions are taken it is only a question of a few days till every pueblo in the agency will have it.

Very respectfully,

N. S. WALPOLE,
United States Indian Agent.

The COMMISSIONER OF INDIAN AFFAIRS,
Washington, D. C.

The above authority was granted by wire, and vaccination made as indicated above with perfect success, almost all cases vaccinated taking perfectly, and in a short time the disease was wiped out of the pueblos, regardless of the situation in the neighboring towns, where it raged for months after disappearing from among the Indians.

The present health condition of the pueblos is good, and there is at present no serious illness among any of them.

Physicians.—The experience of the past year has emphasized and increased the need of the physicians for the Pueblo Indians, which I mentioned in my last report last year. The great benefit which the afflicted derive from the scant supply of medicine furnished by the various teachers, and especially the success of the general vaccination last January, have given these Indians a faith in the prescriptions of white men which they never had before. They are continually coming to the various employees for medicines for the numerous diseases which they are heir to; but should some of the employees through inexperience make a serious error in distribution of medicine much of the good which has been done would be lost, and the Indians would in a large degree relapse into their former superstitious beliefs. But were physicians established among them they would be able to strengthen the growing disposition to place faith in the ways of civilization.

I have the honor, therefore, to renew my recommendation that five physicians be appointed for these various pueblos, which should be divided into five districts, as follows: The pueblo of Zuñi, containing 1,422 inhabitants, to be the first district and to have a resident physician; the pueblos of Acoma, Isleta, and Laguna, containing about 3,000 inhabitants, to compose the second district, with

a physician resident at Laguna; the pueblos of Cochiti, Jemez, Santa Ana, Santo Domingo, Sandia, San Felipe, and Zia, containing 2,957 inhabitants, the third district, the physician to reside at Bernalillo; the pueblos of Taos and Picuris, containing 498 inhabitants, the fourth district, the physician to reside at Taos City, three miles from Taos pueblo; the pueblos of Santa Clara, San Ildefonso, San Juan, Nambe, and Tesuque, containing 958 inhabitants, to be the fifth district, the physician to reside at Santa Fe or Espanola. These pueblos have been grouped with reference to their proximity to one another rather than to their number of inhabitants.

Witch hangers.—On November 23 I made the following report of my action in this case:

PUEBLO AND JICARILLA AGENCY,
Santa Fe, N. Mex., November 23, 1898.

SIR: I have the honor to state that I found four Zuñi Indians confined in the Albuquerque jail awaiting trial for assault committed upon an old woman of their pueblo in March, 1897. These people thought that she was a witch and attempted to take her life, in which endeavor they almost succeeded. They had been in jail about thirteen months, during which time their trial has been postponed from term to term of the court. After consultation with Colonel Duncan, Indian inspector, Mr. Howard was sent to Albuquerque to procure the release of these Indians. They have, through his efforts, been released to appear before the court at its February term. The moral effect of this long imprisonment has been good. The Indians assured me that on account of the kind treatment these prisoners have received from this office they will place twenty-five children in the Albuquerque school. I have had a consultation with the district attorney, and he informs me that, in his opinion, when the case comes up for trial it will be impossible to convict them. In view of this it seems to me that it would be better to have the case annulled, with the understanding that they left on their good behavior, than to permit them to be acquitted.

This is the same case which has caused so much trouble during the administration of the previous agents, and was fully reported by Captain Nordstrom something more than a year ago.

Very respectfully,

N. S. WALPOLE,
United States Indian Agent.

The COMMISSIONER OF INDIAN AFFAIRS,
Washington, D. C.

Upon the recommendation of this office the case was annulled when it came up for trial at the February term, and the Indians were given to understand that it was an act of clemency on the part of the Government and based upon the presumption of their future good behavior.

Irrigating ditches.—A majority of the pueblos are sole owners of irrigating ditches, from which they are enabled to supply their lands with water. Some of these are among the best ditches in their part of the Territory, and supply the pueblos with an abundance of water. In some of the pueblos, however, the supply of water is inadequate for all the ditches and there is frequent scarcity.

The case of the Albuquerque Land and Irrigation Company *v.* The Pueblos of Sandia, Santa Ana, and San Felipe has been decided in the court in favor of the company. This is a case where the company proposes to construct an irrigating ditch through the land of these pueblos. It was opposed because at certain seasons of the year the Rio Grande has not sufficient water to supply the ditches of these pueblos and of the company at the same time, and the Indians fear that, as the headworks of the the proposed canal are above the head of their ditches, it will cause a scarcity of water in their ditches. The decision of the court permits the ditch to be dug, but does not permit the appropriation of water which the Indians at present have.

In the early spring the pueblo of Santo Domingo became engaged in litigation over the title to their ditch, water rights in same being claimed by certain Mexicans and water taken therefrom without consent of the Indians. The result of the suit was a complete victory for the Indians, they being given full and absolute ownership and control.

The pueblo of San Ildefonso became involved in similar disputes, but the matter was settled amicably, and I hope they will have no further trouble.

Civil proceedings have been brought by various parties against the pueblo of Nambe in reference to control of an irrigating ditch which is on Indian land and was constructed by the Indians. The case will be tried shortly.

Litigation.—Following is a résumé of the cases now pending or about to be instituted in the various courts in which pueblos are interested:

Acoma pueblo: None.

Cochiti pueblo: Nothing farther than a possible conflict of boundaries with the Caja del Rio grant.

Isleta pueblo: Should cases Nos. 274 and 275 of the land-court docket, now on appeal to the United States Supreme Court be affirmed, the matter of their surveys will be pending for settlement.

The matter of survey of cause No. 273 of the docket of the United States land court—the "Lo de Padillo" grant—is pending in said court.

Several of the Isleta Indians are incarcerated under indictment for assault with intent to kill.

I am advised by the attorney for the Pueblo Indians that the railroad is responsible for damages for killing an Indian boy of this pueblo. The matter has been placed in his hands with instructions to take steps to collect said damages. In case the railroad refuses to pay damages, suit will be brought so soon as the Indians can raise funds to pay court fees.

Jemez pueblo: Conflict in boundaries with the Vergara grant.

Laguna pueblo: The San José del Encinal grant, subject of cause No. 114, United States land court, which conflicts with the Pahuate tract, property of the pueblo, was confirmed by the court, but order subsequently entered that no decree of record be made until the United States Supreme Court decides cause No. 112, the Cuyamunge grant case, so that this matter may be said to be pending in the land court.

Suits in ejectment and for trespass in and upon lands of this pueblo are in order, and will be instituted as soon as funds are provided.

Nambe pueblo: An appeal is pending to Territorial supreme court from decision of district court of Santa Fe County, affecting adversely lands of the pueblo.

Suit against pueblo relative to irrigating ditch is treated under heading "Irrigating ditches."

Picuris pueblo: None.

Sandia pueblo: None.

San Felipe: This pueblo was coclaimant with the pueblo of Santo Domingo before the United States land court in causes Nos. 184, 184, and 185, consolidated, for what is known as the "Pasture grant," made to these pueblos jointly, A. D. 1770. The decision of the United States land court in their claim appearing to the pueblos and to their attorney to be contrary to law and justice, an appeal has been taken to the United States Supreme Court. The necessary funds for the printing of the transcript and brief will be raised by these pueblos at much sacrifice, unless the Government will provide for same.

Suit in partition and to quiet title will have to be instituted in behalf of this pueblo and Santo Domingo pueblo in the matter of the "Santa Rosa de Cubero" grant, No. 267 on the land-court docket, in which they have become interested by virtue of ancient purchases. These pueblos own nearly, if not the whole, of this grant, and it is included within their patents, but the claim of other parties render this course necessary.

San Ildefonso pueblo: A question of trespass upon pueblo lands.

San Juan pueblo: None.

Santa Ana pueblo; A question as to the survey under the confirmation of their grant is pending before the land court.

Santa Clara pueblo: The matter of the survey of the Canada de Santa Clara or Juan Tafoya tract, confirmed to this pueblo by the United States land court, is pending therein.

The matter of the Santa Cruz grant, cause No. 184, which offsets the eastern half of this pueblo grant, is pending in the United States land court, and will come up for final hearing at the approaching August term, 1899.

Santo Domingo pueblo: See above relative to San Felipe pueblo.

The Lo de Basquez grant claim No. 178 upon the docket of the land court is in conflict with the pueblos lands of Santo Domingo and order has been made by said court to make the pueblo party defendant. The case may come up for action at the approaching August term, 1899.

Taos pueblo: This pueblo is interested in the proper final adjudication in the land court, in which the same is pending, of the San Fernando de Taos grant, No. 149.

This pueblo claims, by virtue of ancient purchases, a large interest in the Antonio de Martinez of Lucero de Godoi grant adjoining the pueblo league upon the west and north thereof, which grant was confirmed by the United States land court in 1892, but the confirmees deny that any interest is held in said grant by the Taos pueblo.

The pueblo is much harrassed and imposed upon by trespassers upon their lands, and it will be necessary to quiet title in two suits, one as to the pueblo lands, or league, and one as to the Martines grant. These suits will entail considerable expense which the pueblo is not in a position to incur without sacrifice of some of their farming land.

Tesuque pueblo: None.

Zia pueblo: None.

Zuni pueblo: None.

The attorney for the pueblos has been instructed to push all the above cases as rapidly as possible.

In all these cases which are upon appeal there are certain court costs which the Government has not heretofore paid and which the Indians themselves are unable to pay without selling their farming land, and thus depriving themselves of future means of subsistence. The same applies to those cases which must be instituted in the district court, which includes all cases where lands belonging to the Indians are claimed by parties other than the United States and all cases of water rights.

In view of the above, I respectfully recommend that the sum of $1,000, or so much thereof as may be necessary, be appropriated and authorized for the payment of court expenses in cases in which the pueblos are interested.

Present condition.—On account of the scarcity of rain during the early part of the season, there being practically no rainfall from October until July in any of the country occupied by them, the various crops on which they depend for a living are in most cases a complete failure. Corn was planted in the dust in the hope that rain would come and supply water for irrigation, but the rain did not come and consequently the seed would not germinate. In most cases what little water was found in the streams was the subject of continual dispute between the various parties owning the water rights, none of them being able to secure the amount of water usually appropriated. In addition to failure of the cereals the late frosts in the spring destroyed all the fruit, so that the magnificent fruit trees which furnish a large part of the food of the people are this year of use only for their shade. Last year the great poverty of two of the pueblos was such that it was necessary to extend Government aid in order to prevent starvation. Every appearance points to the fact that through no fault of their own many of the Indians will be on the point of absolute starvation, and it will be necessary to extend far more aid than last year to prevent numbers of them from dying from hunger.

Last year 12,793 acres were cultivated by the Indians; they raised thereon 65,353 bushels of wheat, 58,801 bushels of corn, 25,053 bushels of beans, besides small quantities of other vegetables. A very conservative estimate of the value of products of Indian labor sold in the market last year places the amount at $50,000. These figures show that the pueblos are worthy of the utmost consideration and are not afflicted with proverbial "laziness" of the other Indian tribes of the United States. They have always been a self-supporting people, living in peace with their neighbors. Their disposition to permit themselves to be imposed upon rather than engage in strife is taken advantage of by their neighbors, and thus they lose some rights which belong to them.

They own 7,294 horses, 490 mules, 3,018 burros, 3,184 cattle, 1,019 swine, 70,332 sheep, 2,020 goats, and 3,871 domestic fowls.

JICARILLA.

Population.—The census taken June 30 shows a population of 832—407 males and 425 females. There are 251 children of school age, 120 being males and 131 females.

Agriculture.—This reservation has very little arable land, but is one of the best grazing districts in the Territory. Water could be secured from Dulce and Stinking lakes, 6 and 26 miles south of Dulce, which is the agency headquarters, and a part of the reservation be placed under irrigation, whereby the Indians could be enabled to raise farm products successfully.

Timber.—A large part of the reservation is covered with exceptionally fine timber, part of which could be marketed and the proceeds used in the purchase of cattle and sheep for the Indians. In this way the Jicarilla Apaches can be made self-supporting in a very few years, but unless they are given the means to turn their attention to stock raising they will continue to be a care to the Government for many years to come. This timber standing as it does is of no value to any one, but could easily be the means of giving the Apaches a start in self-support, which would be the means of relieving the Government of the responsibility and transform them from dependents to citizens.

Allotments.—Some years ago allotments were made to the Indians then living, but owing to confusion of names it has been found impossible to deliver most of

the patents, only about 14 per cent of them being delivered, the others remaining stored away in the agency office for lack of means to identify the Indians to whom the patents belong.

Missionaries.—Two ladies are supported by the Methodist Church at Dulce, and are doing everything in their power to elevate the Indians and give them moral and religious instruction. They hold weekly religious services and in various ways contribute to the uplifting of the people among whom they labor.

Roads and bridges.—It has been impossible to keep statistics of the amount of work done by the Indians on roads during the year, but 6 miles of new road have been built and all old roads and bridges kept in good repair.

Arts and trades.—These Indians are noted for the excellence of their baskets, and arrows, and beadwork. A large proportion of the amount realized from sale of products of Indian labor came from these items.

Indian courts.—The court here is composed of three judges, who look after minor offenses on the reservation. Drunkenness is punished by confinement in the agency jail, 67 cases being so dealt with during the past year.

Products and stock.—There is 800 acres of land cultivated by the Indians, on which they raised 225 bushels of wheat, 600 bushels of oats, 125 bushels of corn, 500 bushels of potatoes, 20 bushels of onions, 35 bushels of beans, and 50 bushels of other vegetables. They also cut 700 tons of hay, part of which was marketed.

They own 1,650 horses, 10 mules, 250 burros, 95 cattle, 2,500 sheep, 500 goats, and 75 domestic fowls. They have the means to care for a much larger quantity of stock of all descriptions.

Issues.—About half the support of the Apache Indians is derived from the issue of Government rations, though the rations issued are not half sufficient to supply their actual needs. Issues are made semimonthly.

There are also small issues of annuity goods each year, but no annuity money, so that all money which they obtain is derived from the sale of their own products.

Education.—These people are as yet without school facilities, and the matter has been very strongly advocated during the past year. Plans and specifications are being drawn for a school building with capacity of 228. This is a very important move and the building should be completed as soon as possible, as the Indians are very anxious to have their children educated, but are unwilling to send them to distant schools. There are on the reservation 251 children of school age, none of whom are in school anywhere.

Health.—I was notified by wire, March 8th, that there was one case of smallpox on the reservation. I took the first train for the reservation and wired to St. Louis for vaccine points and tubes. On reaching Dulce I established a pesthouse and employed nurses to care for the sick. As soon as vaccine matter could be procured the whole tribe was vaccinated. All cases taken sick were confined in the pesthouses, another being established on a different part of the reservation a few days later, until their recovery, when their clothing was burned and new clothing issued to them.

I found it much easier to control the disease on this reservation than among the pueblos on account of these Indians not being so closely crowded together.

Investigation showed that the smallpox was introduced by a Mexican trespassing on the reservation at a point 25 miles from the agency.

During the months of March and April there were 27 cases and 11 deaths.

Too much credit can not be given to the employees for their faithful and fearless work in vaccination and caring for the Indians who were exposed or afflicted with the disease.

Dwellings.—During the past year 42 dwellings were built on the reservation, making a total of 290 now occupied by Indians. They are gradually leaving their tepees for the greater comforts of houses.

Present condition.—The severity of the past winter was such that the Indians were compelled to use their seed grain and potatoes for food in order to relieve their hunger, which necessitated the issue to them in the spring of new seed for planting. There is every prospect that conditions will be more severe this year, as their crops are almost a total failure owing to the extraordinary drought of the past nine months, and they will be compelled to live upon the Government rations, which are not sufficient to keep them from want, supplemented with the small amount earned from the sale of bows and arrows, baskets and beadwork.

Respectfully submitted.

N. S. WALPOLE,
United States Indian Agent.

The COMMISSIONER OF INDIAN AFFAIRS,
Washington, D. C.

INDIANS.

The following is a list of the Indian pueblos in New Mexico, with the population of each:

Acoma, 504; Cochiti, 300; Isleta, 1,060; Laguna, 945; Nambe, 75; Piscuris, 110; Pojaque, 20; Santa Ana, 222; Sandia, 126; Santa Clara, 200; Santo Domingo, 793; San Felipe, 475; San Ildefonso, 112; San Juan, 360; Taos, 375; Tesuque, 85; Zia, 100; Zuñi, 1,500—making 18 pueblos in all.

The Mescalero Apaches occupy a reservation within the boundaries of Donna Ana and Lincoln counties. They are far removed from the predatory tribes, and have not given any trouble since the early eighties.

The Navajos cut a very small figure in New Mexico. Their reservation occupies 15,000 square miles, of which only about 1,900 square miles are within New Mexico, and that small portion is confined to the extreme northwestern corner. These Indians own over 2,000,000 head of sheep, 2,500 head of cattle; the Government is reclaiming their land by irrigation, and the settlers need fear no incursion from them; they are under the charge of an army officer and are perfectly amenable to authority.

In this connection it might be mentioned that the Government never took a wiser step than to remove the control of Indians from civil to military authority. It has worked wonders in New Mexico. The army officers handle the Indians with a certain firmness that quickly begets docility, and the Indians themselves soon learn that they fare better.

MESCALERO RESERVATION.

A marvelous transformation took place on the Mescalero Apache Reservation in southern New Mexico during the two years that First Lieut. V. E. Stottler, Tenth Infantry, United States Army, served as acting agent. The Indians numbered over 500, one-fifth being children of school age. Nurtured in ignorance and superstition and reared in filth and laziness, these Indians have for forty years stubbornly refused to respond to the Government's efforts to civilize them. For a generation they have received rations of beef, coffee, flour, sugar, clothing, farm implements, etc. Good schools were established for them and dwellings built at the Government's expense; still they stuck to their rawhide tepees and persistently refused to school their children or to adopt the civilian dress, adhering to their breech clouts, blankets, and long hair. With the millions expended annually in education, next to nothing was being accomplished. There were about 500 acres of irrigable and good land on the reservation, but the Indians were too lazy to plant crops that would have furnished them with food necessary for their support. It was much easier and more pleasant to draw rations from an indulgent and paternal Government and reserve their energy for war dances and brawls. There were 25 strong, broad-shouldered bucks, educated at the expense of the Government, running around the reservation in paint and blankets. They were too lazy for manual labor. Several educated squaws were married and living in filthy tepees, while girls were taken out of school at 10 and 12 years of age and sold for ponies into a bondage worse than death.

Lieutenant Stottler's predecessor had ordered the bucks to cut their hair, and a revolution resulted. They refused point-blank and that settled it. Stottler's first move was to increase the rations of the police.

He then informed them that they must all put on uniforms under pain of duress. They reluctantly obeyed. Then he ordered them to cut their hair. This caused a storm, and the matter was allowed to rest for a while. His next command was to abandon tepees and move into dwellings. All children over 5 years old were ordered to attend school. This was too much, and, by the advice of some of the whites, a petition was forwarded to Washington asking for Stottler's relief as agent. No attention was paid to the request, and the ringleaders were spotted and severely punished. The chief of police, an Indian, had been one of the instigators in this move, and he was discharged as such and put on reduced rations. Several of the headmen of the tribe were ordered to work and deprived of the office of spokesmen, under which system the other members made their wants known through the agent. In this capacity the headmen had been allowed extra rations and a small salary, and their reduction to the ranks made it possible for any member of the tribe to apply personally for what he needed in the way of land, implements, etc. This was an important point—to break the power of the chiefs and destroy tribal relations. It was constantly impressed upon the Indian that in a few years rations would be cut off entirely, and those who had not taken the land for cultivation would go hungry. At first they laughed at this, but the officer, by way of example, cut off the food occasionally, and they at last came to realize that it would be a very easy matter to stop all rations. This had a salutary effect, and induced many of them to go to work. Every man and woman caught manufacturing "tiswin" was made to understand that it meant a long season in the guardhouse on bread and water.

Now, all is changed. The Government's agent is absolute master. Vegetables of all kinds are raised in abundance, and everything in the way of stock on a farm is also raised by the Indians on this reservation. During 1896, upon the recommendation of Lieutenant Stottler, the Government issued 5,000 sheep for distribution among the tribe and 500 for the school. The idea was to have the Indians raise their own mutton and then cut off the supply of beef, which cost the Government $6,500 per annum. These Indians have been made almost self-supporting by the methods inaugurated by Lieutenant Stottler while in charge. Every male on the reservation has cut his hair, put on civilized dress, and taken a piece of land which he has fenced, and commenced to raise grain and vegetables. They all have cabins with cook stoves and utensils. Every man has 10 head of sheep and a like number for each member of his family. Every child on the reservation is at school. Every man has a wagon, harness, and plow. In the short period of two years these Indians have been transformed from lazy, filthy savages in red paint and breech clouts into reasonable working human beings with a care for to-morrow and a desire to become useful citizens. The United States Indian agent who has taken the place of Lieutenant Stottler says that the Mescalero Indians are steadily advancing toward civilization and self-support; that they now receive no aid from the Government in the way of rations and supplies. Their ranches compare very favorably with the ranches of their white neighbors which surround the reserve. Their crops of oats, wheat, corn, potatoes, cabbage, etc., are in the finest condition, and an abundance for sale is expected. They expect to dig 2,000,000 bushels of potatoes this fall, worth at 1 cent per pound, $20,000. This is only one small item, as their oat and wheat crop should bring in more than the above amount. Altogether, the great progress of the Mescalero tribe of

Indians in this Territory is something to be proud of, and it demonstrates the possibilities of this race, which heretofore has always been a ward of the Government.

NAVAJO INDIANS.

FORT DEFIANCE, ARIZ., *August 28, 1899.*

MY DEAR GOVERNOR: Complying with your request for a statement concerning the condition of the Navajo Indians under my charge, I respectfully submit the following:

The condition of the Indians on this reservation is undoubtedly improving financially and morally, although the last winter was probably the most severe of any in the history of this country, which caused a heavy loss among their flocks, on account of the very deep snow and the unusually cold winter. This condition, however, was not confined to this locality alone, as the severe cold extended over the greater part of the United States. Notwithstanding the severity of the winter there has been no case reported to me of any Indian either starving or freezing. From the most reliable information I can obtain the greatest loss occurred on the western part of the reservation in Arizona, in a country that has usually been free from snow. The spring has been rather backward and in some localities there has been a lack of moisture, but those who planted and attended their crops well will have quite a fair crop, and as we have had during July and August copious showers of rain the grass has made such wonderful growth that every indication now is that their stock will go into the winter in good condition.

The disposition of these people is generally good. They very seldom have any serious troubles among themselves and but very few complaints are made against them by the whites, and nothing of a serious nature, although along the border of the reservation they have very frequent business transactions with the white settlers. Some on the eastern border, and especially a few that reside off the reservation in New Mexico, are inclined to more readily adapt themselves to the ideas and customs of the whites, and I have induced a few of them to dig wells on their places for the purpose of procuring water for their herds, which has proved a grand success, as some of them have secured an abundance of water at a depth of about 20 feet, and I shall use every effort possible to induce others to follow their example, which, if successful, will go far toward solving the water problem. The main support of these people is stock raising and the manufacture of Navajo blankets; the sale of blankets alone will amount to possibly $100,000, and the wool clip sold will far exceed that. The sheep pelts and goatskins sold from their butcher stock will amount to many thousands of dollars.

Very respectfully,

G. W. HAYZLITT,
United States Indian Agent.

Hon. MIGUEL A. OTERO,
Governor of New Mexico, Santa Fe, N. Mex.

INDIAN SCHOOLS.

SANTA FE INDIAN INDUSTRIAL SCHOOL,
Santa Fe, N. Mex., September 6, 1899.

SIR: I have the honor to transmit herewith copy of my first annual report of the Santa Fe Indian Industrial School, which original report I have sent to the honorable Commissioner of Indian Affairs.

I receipted for the property and took charge September 1, 1898. For statistical information see tabular report herewith transmitted. It has been the aim of the management to carry the school as an entity, with its two main functions of exactly the same importance. As the name indicates, this is an industrial school, and the handicraft functions must not in any case be overshadowed by the literary function; both must go hand in hand. To this end I have labored early and late to impress upon both employees and pupils that each and every employee of the school is a teacher in the fullest sense of the word. I maintain that my school cook should occupy the same social status as does the most advanced literary teacher in the corps. When a condition of affairs pertains at a school that will allow of a teacher considering himself better than some other teacher because, perforce, one teaches the three R's and the other the manipulation of material by hand, there is, to my mind, something wrong. I am glad to say that at this school our handicraft employees are not considered shoemaker, tailor, etc., but teachers of the various trades mentioned. It is wonderful what a change has come over

this school since the pupils have come to understand that this is a fact. Now the boys and girls in the various trade departments take criticism as kindly from their manual instructors as they do from their instructors in the school rooms. They have learned that the whole purpose of the shops is instruction. They fully realize that they are in the various shops to learn how to manufacture the numerous articles. The learning is what they are there for and whatever they produce is a "by-product." For instance, they manufactured a wagon, not because we needed such an article, but because they learn from the making how to make another wagon.

As shown by statistics, this school can accommodate 300 pupils. The plant is large enough so that we can make an average of this number, which, of course, means that some time during the school year we must carry many more than 300. I know that it is not an uncommon thing for schools of this class to carry an average attendance of 100 per cent upon the enrollment. I can't do this, and I "am not much of a George Washington, either!"

As data in the Indian Office shows, the number of children of school age who have no school accommodation and who are in reach of this school goes up into the thousands. It would seem that this plant should be enlarged to at least twice its present capacity. I am satisfied that the moment we are really equipped to give first-class instruction in the various trades we will be overrun with real Indian children. Of all the various tribes of Indians whom I have met and studied the ones which naturally gravitate to this school are the most thoughtful and observant. For instance, in all my years of work with Indians before coming here I found, without almost a single exception, that the Indian parent demands three things of the school and three only. These demands are as follows: (1) My boy must be well fed; (2) he must be well clothed; (3) he must not be punished. Here they expect these three things and enforce them with a resounding continuous howl when these three things are not complied with; but they demand more. When inspecting the industrial departments their criticisms are just if they are not generous. These huts which we call shops are not at all to their liking. The excellent tools of which we have a fair supply invariably meet with their hearty commendation. The competent tactful employee is known, marked, and complimented, both to his face and to the management, but the incompetent instructor invariably meets with that expressive "ugh," which to us who know the Indian means almost a whole volume. I am satisfied that were the equipment of this school what it ought to be all we would need to fill it up to twice its present capacity would be to invite the headmen of the various tribes and pueblos to come and inspect the plant thoroughly, and they would be followed by all the real full-blood Indian children we would care to see in one school. We take special pride in the fact that without a doubt these pupils average nearer pure Indians than do the pupils of any other nonreservation school in the service, and it is the consensus of opinion that for "staying qualities" when once educated the full blood far exceeds the mixed blood.

The location of this school is ideal. The climate is all that could be desired, the water is superexcellent, the drainage is perfect, the personnel of the force of employees is of the best, the equipment in a literary sense is good, but to get and hold our pupils our equipment for manual instruction must be put upon a plane equal to that of our very best Eastern schools. Nothing short of this must be thought of. Give this school an equipment such as the most advanced thinkers in your office would indorse, and we will fill a school of any capacity that the Indian Office may see fit to erect here, and we will fill it with real Indian youth; and, further, we will fill it without drawing upon children who would, were this school not here, be in some Eastern school. I am most thoroughly in sympathy with the Eastern schools and rejoice to see them grow in numbers and efficiency, but there are Indian children almost without numbers in the vicinity of this school who will never under any circumstances go far away to school. So, while maintaining perfect loyalty to my friends in the Eastern schools and pledging myself to use every influence to persuade any and all of these Indian youth to take advantage of the grand opportunities offered by these schools, I most earnestly and respectfully urge that these children who can not or will not be persuaded to go East be given a chance here among the mountains of New Mexico to get as broad, comprehensive, and useful education as (aside from the environment of a cultured civilization) they can get in any of our great contemporaries.

I reiterate, give us the equipment and we will get the pupils.

Thanking you for the prompt and favorable responses that my requests and recommendations have met at your hands, I am, very respectfully,

A. H. VIETS, *Superintendent.*

HON. MIGUEL A. OTERO,
Governor of New Mexico, Santa Fe, N. Mex.

SANTA FE INDIAN INDUSTRIAL SCHOOL,
Santa Fe, N. Mex., September 4, 1899.

SIR: Referring to your circular office letter "Education," No. 29, of June 26, 1899, asking for data upon which your office will prepare its annual estimate for support of schools, I have the honor to make the following statements:

Number.	For what used.	Character.	Condition.
1	Bakery	Brick	Good.
1	Barn	Frame	Do.
1	Blacksmith shop	do	Fair.
1	Carpenter shop	do	Do.
1	Employees	Brick	Foundation defective.
1	Hen house	do	Good.
1	Hose cart	Frame	Do.
1	Hospital	Brick	Do.
1	Hot house	Frame	Fair.
1	Laundry	Brick	Good.
1	Laundry addition	do	Do.
1	Main building	do	Do.
1	Oil room	do	Do.
1	School building	do	Do.
2	Summer houses	Frame	Do.
1	Tailor and shoe	do	Do.
2	Water closets	do	Fair.
1	Warehouse	Brick	Good.

(1) Present enrollment, 296; average attendance, 258¼.

(2) Probable increase of some 100 or more, if authorized.

(3) *Scholastic population from which school is supported.*—From various pueblos of New Mexico with a school population of 1,400, and from Pima and Navajo agencies, and normal pupils from all Western States and Territories.

(4) Nineteen buildings—9 brick, 10 frame; condition, see above; capacity, 300; value, $49,758.

(5) (*a*) The sewerage is fairly good—10-inch main empties into a dry ravine about 1,000 feet from the school buildings, and is carried by rain floods to the Santa Fe River about 3 miles below Santa Fe, N. Mex.

(*b*) The water supply is furnished by the Water and Improvement Company of Santa Fe from their 10-inch water main, which is laid in front of the school grounds. The school is supplied with good quality of water and in sufficient quantities for the irrigation of 10 acres of ground.

(*c*) Heating is by wood and coal and is as good as can be obtained by that system.

(*d*) Lighting is by kerosene lamps.

One blacksmith shop, one carpenter shop with addition. These are frame buildings and they are a disgrace to the school and should be torn down. In view of the proposed increased capacity and growing needs of this school, I deem it an absolute necessity to have here a trades building and one fully equipped and large enough to teach all the various trades that should be a course of instruction in a school of this kind. For the construction of a building of this kind I most earnestly and urgently recommend that a sum not less than $15,000 be appropriated, for I consider the same to the best interests of this school and the Indian service.

Equipment of shop.—In order to properly equip this shop and to carry on the various industries as desired by your office and myself, it will be absolutely necessary to have therein one 50-horsepower engine, 2 good large boilers, 1 heater and filterer, 160 feet of shafting with sufficient hangers, pulleys, steam gauges, 1 pump, valves, and pressure gauges. In this connection I have also taken into consideration and included in my estimate sufficient piping for conveying steam heat to all necessary buildings on the place. The total cost for the same will not exceed $5,775, and I most respectfully ask your favorable consideration of the same.

School-building extension.—Its capacity will be about 150. There are now about 300 pupils on the ground. It will therefore be necessary to still use the rooms in the main building for school purposes. In view of this fact, I most earnestly and urgently recommend that an addition be made to this school building to increase it to 300 capacity. The cost for the same will be $6,600, which I consider as most conservative, and respectfully ask you to consider the same in a favorable manner.

Dormitory.—One of the great needs of this school is a dormitory building with a capacity of 350 at least. The appropriation for this building should be most seriously considered and without delay.

I have no hesitancy whatever in saying that it can be filled as soon as completed. Indian Agent Walpole and Inspector of Day Schools Burton assure me that there is not the shadow of a doubt but that it can be filled to overflowing as soon as completed, and they have expressed a willingness to do all in their power to assist me in my efforts to do so.

I most earnestly ask you to give this matter your careful consideration. This school can be increased and it will be increased to meet your full expectations if Congress gives us the assistance the school deserves and is unstinted in its liberality to us. I respectfully ask that a sum not less than $26,000 be appropriated for this building. It will give us a building that we may be proud of and one that will be a credit to the service.

Heating.—There is no possible reason why this school should not be heated with steam, and a plant for that purpose can be established here at a most reasonable cost. It would greatly add to the health, comfort, and convenience of everyone here and be one of the main factors in bringing this school up to the standard desired. I most respectfully request that a sum not less than $8,700 be appropriated for this purpose. I am certain that with this sum and with an economical use of the same I can have the work completed in every respect in a first-class and workmanlike manner.

Repairs and improvements.—In this line there is always a great amount to be done. I urgently recommend that a sum not less than $3,000 be appropriated for this purpose. This I consider a most conservative estimate, and if appropriated it will be most economically expended for the best interests of the school.

Warehouse.—This is a one-story brick building and is in good condition, but is entirely too small to store more than one-fourth of the school supplies. It has been necessary for me to store the supplies in the cellars and lofts of the various buildings, and this has been a constant source of annoyance. A good large addition should be made to this building, and I most urgently and earnestly recommend, for the best interests of this school, that a sum not less than $2,000 be appropriated for this purpose. This building was even too small when the appropriation was for 150 pupils, and now, when the supplies received are for 300 and must be even greater in the future, it will be an absolute impossibility to store the supplies without the greatest annoyance and inconvenience and without occupying rooms that are required for other purposes.

Lighting.—An appropriation of $3,000 for an electric-lighting plant at this school was available during the year ending June 30, 1899, but after making every possible effort it was found that not even an inferior system could be installed for that amount. The necessity for an electric-light plant at this school has been demonstrated to your office, and the increased capacity of the school makes the demand for it even greater now. I most respectfully urge that a sum not less than $4,500 be appropriated for a thorough and complete electric-lighting system, and that this appropriation be immediately available. In connection herewith I wish to state that, if an appropriation for a trades building and equipment of same be made as asked for, only $2,000 be appropriated for electric equipment, as the engines and boilers for the trades building will furnish the power for the electric-lighting system.

Water and sewerage.—A sum not less than $2,000 should be appropriated for this purpose. The yearly expense for sufficient water for irrigation and domestic purposes is $1,500, and the balance ($500) is a most conservative estimate for keeping the same in repair and extending and repairing the sewerage system as required.

RECAPITULATION.

Trades building	$15,000
Equipment of same	5,775
School-building extension	6,600
Dormitory	26,000
Heating	8,700
Repairs	3,000
Warehouse addition	2,000
Lighting	4,500
Water and sewerage	2,000
Total	73,575

A. H. VIETS, *Superintendent.*

The COMMISSIONER OF INDIAN AFFAIRS.

SURVEYOR-GENERAL.

The following is taken from the annual report of the United States surveyor-general for the district of New Mexico for the fiscal year ending June 30, 1899:

The sum of $10,000 from the appropriation for surveying the public lands for the fiscal year ending June 30, 1899, was apportioned to the district of New Mexico.

Under said apportionment one contract, liability $3,000, was awarded and approved; fourteen sets of special instructions (total liability, $1,327), in lieu of contracts and bonds, providing for resurveys and making connection of private land claims with the public land surveys were awarded, payable from this appropriation.

Six contracts (total liability, $3,025.75) and three sets of special instructions (total liability, $550) were awarded, issued, and approved, payable from the appropriation for the survey of confirmed private land claims in designated States and Territories for the fiscal year ending June 30, 1899.

The total number of miles of different lines established during the year aggregate 1,462 miles 32 chains and 38 links.

Two thousand and fifty-five letters were written during the year, and 416 official letters were received and recorded; plats, transcripts, and field notes compared and transmitted or ready for transmission, 610; special instructions for the survey of public land grants and small-holding claims made out in duplicate, 42; general instructions for the survey of small-holding claims prepared in triplicate, 27; mineral plats prepared, 124; books of field notes examined and corrected, 208.

During the fiscal year 171 tracings and descriptive lists were furnished to the district land offices—Santa Fe, 73; Las Cruces, 92; Roswell, 6; total, 171.

For the fiscal year ending June 30, 1899, $1,600 was deposited on account of the surveys and amended surveys of mining claims; reports were made on 65 placer and load mining claims.

During the said fiscal year mining-district plats were completed for the 77 mining districts in the Territory of New Mexico, which required the making of 138 distinct plats.

In his annual report the surveyor-general says:

During the said fiscal year 46 townships have been platted, showing sections and lots made fractional by mining locations situate therein, the areas computed, and tracings of same furnished to the local land offices and to the General Land Office. There is still a large amount of this work to be done, which should be finished at the earliest practicable date. On account of numerous errors in old mining surveys, it has been found impossible to properly plat and show fractional lots in the numerous townships in which the same are situate, and the same should be taken up at an early date with a view to straightening out all such irregularities, after which the same should be platted and tracings of such township furnished to the local land offices in the different districts of the Territory and to the General Land Office.

I would urge the importance of an appropriation for the restoration of mineral monuments and their proper connections with public surveys and with each other. A majority of the mineral monuments in this district are on unsurveyed ground and mining claims connected with such monuments. Most of such monuments were established many years ago, without regard to their permanency of construction, and were insufficiently witnessed. Many of these monuments have now become obliterated or destroyed, and as the same are the official points of reference by which to fix the locus of all surveyed and patented mining claims, it is of great importance that they should be properly perpetuated, and they should be reestablished permanently and witnessed by connecting them with public surveys, with each other, and with natural objects.

Mining-claim surveys should be examined in the field to insure their correctness, in a like manner as the surveys of public lands and private land claims, to obviate errors and irregularities, and in order that patents to such mining claims shall properly recite claimants' lands, and I believe claimants are entitled to such a proper safeguard. Numerous patents for mining claims in this district recite wrongly the lands which claimants intended to cover, by reason of errors in lines and connections made by deputies during the past thirty years.

The act of Congress approved March 3, 1891, entitled "An act to

establish a Court of Private Land Claims, and to provide for the settlement of private land claims in certain States and Territories," provides, among other things, that—

No allowance or confirmation of any claim shall confer any right or title to any gold, silver, or quicksilver mines, or mineral of the same, unless the grant claimed affected the donation or sale of such mines or minerals to the grantee, or unless such grantee has become otherwise entitled thereto in law or in equity, but all such mines and minerals shall remain the property of the United States, with the right of working the same, which fact shall be stated in all patents under this act, and no such mines shall be worked on any property confirmed under this act without the consent of the owner of such property, until specifically authorized thereto by an act of Congress hereafter passed.

No act of Congress has yet been passed giving persons the right to work the mines or minerals on grants confirmed under this act, and in view of the fact that a large number of persons in this district have made locations of mining claims upon lands which are or will be included within the boundaries of grants confirmed under said act, in justice to such locators, and to carry out the intentions of said act of March 3, 1891, an act of Congress giving miners the right to work such minerals as are reserved in the confirmation of grants by the said Court of Private Land Claims should be passed at an early date. Such a law would greatly facilitate the development of the natural resources of the Territory within interior boundaries of said grants and materially benefit our population. I request that your office present this matter properly before the next Congress and urge the passage of an act for the purposes as herein recited.

There are still pending before the Court of Private Land Claims 35 cases. Within the 35 grants pending there are between 4,000,000 and 5,000,000 acres of land. Twenty-two private land claims have been surveyed or corrected surveys of the same made under decrees of approval and confirmation by said court during the fiscal year.

There have been upward of 4,000 small-holding claims filed under the provisions of sections 16 and 17 of the act of March 3, 1891. Such of said claims as are located upon townships not heretofore surveyed, and as are found upon proper investigation to be valid, are being surveyed as the lines of public surveys are extended over such townships.

Sixty-three mineral surveys were executed during the fiscal year ending June 30, 1899. Seven mineral surveys were ordered during the year of which no returns have as yet been made. Fifty-one placer mining claims were examined and reported upon during the year.

Forty-nine mineral monuments were established and approved during the fiscal year.

In his estimate for the survey of the public lands, small holdings, and private land claims for the year ending June 30, 1901, the surveyor-general submits the following items, viz:

For survey of public land and "small-holding" claims filed under the act of March 3, 1891, as amended February 21, 1893, $25,000.
For the survey of private land claims, $20,000.

Commenting on the greater necessity for the survey of public lands in the future than has been in several years past, the surveyor-general reports as follows:

The unsurveyed lands in numerous localities in this district are being rapidly settled upon, and as such settlers will continue to locate upon such lands, there will be greater demand for public-land surveys in the future than there has been in the past. There are approximately 2,400 small-holding applications on file in this office for tracts of land in unsurveyed townships and within the boundaries of unconfirmed grants. A majority of said tracts will have to be surveyed when

the lines of the public surveys are extended over the townships in which they are situate. By reason of the rejection by the Court of Private Land Claims of certain grants and the reduction in area of others, the lines of public surveys will have to be extended over such lines as were formerly embraced in said grants and which have not become public domain by reason of said rejection, which lands are found to be agricultural in character and are occupied in whole or in part by actual settlers.

The boundaries of the small-holding claims of such settlers as are found to lie within unsurveyed townships will have to be established at the time of making the surveys of such townships, and a great many other small-holding claims lying within townships heretofore surveyed will have to be surveyed under per diem contracts, which said contracts are also made payable from the appropriation for the survey of the public lands, and by reason of the amendment of June 27, 1898, to the act of March 3, 1891, which extended the time for such small-holding filings in this office to March 4, 1891. Numerous other small-holding filings are being daily made by claimants who had not heretofore filed on such small-holding tracts, either through ignorance of the law or for the reason that they could not at that time show twenty years' continuous adverse possession, or which small-holding tracts had been covered by grants which have since been rejected by the Court of Private Land Claims, and it is safe to predict that prior to the expiration of the time for filing under said act, as extended by such amendment, there will have been filed in this office upward of 6,000 small-holding claims, there being at the present time over 4,000 of such filings.

Twenty thousand dollars is estimated for the survey of private land claims in New Mexico, from the fact that the docket of this office shows that there are still pending 79 grants in an uncompleted condition, of which number 24 grants have been confirmed by the Court of Private Land Claims and 20 rejected. Of these 24 confirmed grants, 14 are on appeal before the Supreme Court of the United States, and the 20 rejected grants are also on appeal. There are 35 grants untried of this total number of private land claims. A majority will undoubtedly have to be surveyed under confirmation, as the same becomes final, and the said amount of $20,000 will therefore be necessary for the survey of private land claims in New Mexico.

This appropriation for the survey of confirmed private land claims should be made available for the execution of the survey of such grants in the field, the cost of field examination, advertising, and the cost of office work in this office.

UNITED STATES LAND OFFICE.

Statement of business transacted at Clayton, N. Mex., for the fiscal year ending June 30, 1899.

Class of entries.	No.	Acres.	Commissions.	Fees.	Amount.
Sales land at public auction	1	40.00			$50.00
Excess payment on homestead, timber, and other entries and locations	17	51.03			63.77
Original entries under desert-land act	4	399.38			99.85
Final entries desert lands	1	80.00			80.00
Homesteads commuted to cash	5	682.71			853.39
Total cash sales	28	1,253.12			1,157.01
Original homestead entries	259	40,200.25	$1,507.53	$2,500.00	4,057.53
Final homestead entries	87	13,700.83	517.12		517.12
Final timber entries	8	1,280.00		32.00	32.00
Applications to purchase coal lands	1	160.00		3.00	3.00
Soldiers and sailors homestead declaratory statements	1	160.00		3.00	3.00
Amounts received reducing testimony to writing				246.00	246.00
Total all classes	384	56,754.20	2,024.65	2,834.00	6,015.66
Salary, fees, and commissions, register and receiver					3,331.52
Expense of depositing					6.75
Incidental expenses					352.40
Total					3,690.67

Statement of business transacted at Clayton, N. Mex., etc.—Continued.

County.	Unappropriated and unreserved.			Area reserved.	Area appropriated.	Total area Santa Fe district.	Total number of acres filed upon during fiscal year ending June 30, 1899.
	Surveyed.	Unsurveyed.	Total.				
Bernalillo	1,863,155	420,010	a 2,283,165	942,837	2,480,998	5,707,000	6,119
Colfax	226,941	23,040	b 249,981	.....	1,544,864	1,794,845	3,520
Guadaloupe	1,042,181	10,000	b 1,052,181	.....	537,579	1,589,760	3,052
Mora	404,380	102,160	b 506,540	.....	742,460	1,249,000	9,675
Rio Arriba	1,482,624	799,400	a 2,282,024	840,161	1,136,815	4,259,000	1,904
San Juan	1,023,453	484,440	b 1,507,893	1,958,400	230,707	3,697,000	1,731
San Miguel	835,459	89,860	a 925,319	202,550	1,203,131	2,331,000	10,493
Santa Fe	554,274	60,136	a 614,410	188,900	579,090	1,382,400	4,453
Socorro	1,129,743	128,080	a 1,257,823	.....	890,177	2,148,000	160
Taos	332,862	330,052	a 662,914	119,931	687,155	1,470,000	237
Valencia	2,389,212	313,620	a 2,702,832	634,563	2,511,605	5,849,000	2,600
Total	11,284,284	2,760,798	14,045,082	4,887,342	12,544,581	31,477,005	43,944

a Mountainous timber and grazing. b Grazing and agricultural.

Lincoln land district, Roswell, N. Mex., June 30, 1899.

County.	Area unappropriated and unreserved.			Area reserved.	Total area disposed of.	Area of land of the county in land district.	Area of land disposed of during the fiscal year, 1899.	Number of acres entered under homestead laws, 1899.
	Surveyed.	Unsurveyed.	Total.					
Chaves	4,879,548	2,120,353	6,999,901	3,280	526,339	7,529,520	35,908	19,511
Eddy	1,798,435	2,263,741	4,062,176	6,300	261,524	4,320,000	13,818	8,757
Guadaloupe	6,720	.....	6,720	.....	1,280	8,000	.....	.....
Lincoln	2,163,341	118,354	2,281,695	91,560	313,036	2,686,291	7,279	7,259
Otero	222,909	1,377,549	1,600,458	208,440	12,291	1,821,189	803	800
Valencia	145,040	.....	145,040	.....	12,960	15,800	.....	.....
Total	9,215,993	5,869,997	15,085,990	309,580	1,127,430	16,380,800	57,808	36,327

Las Cruces land district, Las Cruces, N. Mex., June 30, 1899.

County.	Area unappropriated and unsurveyed.			Area reserved.	Total area disposed of.	Area land surface in counties.
	Surveyed.	Unsurveyed.	Total.			
Donna Ana	4,140,026	656,594	4,796,620	335,378	141,002	5,253,000
Grant	3,931,228	1,388,882	5,320,110	7,414	658,476	5,986,000
Lincoln	66,099	251,825	317,924	70,000	12,076	400,000
Sierra	1,524,303	274,379	1,798,682	74,875	99,443	1,873,000
Socorro	5,191,078	2,076,501	7,267,579	337,459	132,962	7,738,000
Total	14,852,734	4,648,181	19,500,915	825,126	1,043,959	21,250,000

	Acres.
Located under homestead law	36,166.69
Located under desert-land law	2,067.27
Located mineral lands	599,908.00

UNITED STATES COURT OF PRIVATE LAND CLAIMS.

SANTA FE, N. MEX., *September 11, 1899.*

MY DEAR SIR: I am in receipt of your letter of September 8. Pursuant thereto I take pleasure in inclosing herewith tabulated statements of the work of the Court of Private Land Claims during the year ending September 8, 1899, and also showing status of the remaining business on the New Mexico docket of that court. I regret that this data has not reached you sooner, but the receipt of your letter was the first intimation which this office had that it was desired. In addition, the summer session of the court adjourned only last Tuesday, so that the delay enables us to furnish you with a complete statement of the work for the year, whereas a statement rendered earlier would have been necessarily incomplete.

Very respectfully,

WM. H. POPE,
Assistant United States Attorney.

Hon. MIGUEL A. OTERO,
Governor of New Mexico, Santa Fe, N. Mex

(One inclosure.)

SCHEDULE NO. 1.

List of cases in the New Mexico district decided by the Court of Private Land Claims during the year from October 1, 1898, up to and including October 1, 1899.

P. L. C. No.	Name of grant.	Acreage.		
		Claimed.	Confirmed.	Rejected.
71	Tres Alamosa	43,384.64		43,384.64
127	Town of Socorro	843,259.00		843,259.00
132	Reyes Pacheco	600.00		600.00
137	Santo Tomas de Iturbide	8,680.00	6,680.00	
138	Jose Manuel Sanchez Baca	4,340.00	4,340.00	
143	José Sutton	69,445.00		69,445.00
149	Fernando de Taos	1,000.00	1,000.00	
150-198	Refugio Colony	26,130.00	26,130.00	
151	Mesilla Colony	17,361.00	17,361.00	
152	Estancia	415,036.00		415,036.00
165-206	Abo Mine	16,000.00		16,000.00
178	Lo de Basquez	76,000.00		76,000.00
194	Santa Cruz	64,000.00	1,000.00	63,000.00
251	Diego de Belasco	5,000.00		5,000.00
256	Santo Toribio de Jemez	100,000.00		100,000.00
	Total	1,690,235.64	58,511.00	1,631,724.64

SCHEDULE NO. 2.

Surveys of grants approved in New Mexico district during the year ending October 1, 1899.

P. L. C. No.	Name of grant.	Acreage in survey.
6	Sebastian de Vargas	13,434.28
30	Piedra Lumbre	49,749.89
35	Jacona	6,952.84
51 106	Ranchos de Albuquerque	35,084.78
54	Galisteo	260.79
64	San Clemente	37,099.29
73	Pajarito	28,724.22
85	Salvador Gonzales	202.82
133	Pueblo of Laguna	17,328.91
214 243	Cieneguillo	8,202.79
217 258	Town of Bernalillo	8,404.67
	Total	195,445.28

SCHEDULE No. 8.

Cases on docket of New Mexico district not finally disposed of; also status of each of said cases.

A.—PENDING FOR PRIMARY DETERMINATION.

P. L. C. No.	Name of grant.	Acreage claimed.	Remarks.
8	Town of Albuquerque	17,361	Remanded by Supreme Court (171 U. S., 685).
25 60 198	San Miguel del Bado	3,000	This represents estimated area of allotments. Claim to unallotted lands rejected (167 U. S., 278).
109	Conejos	2,500,000	Mostly in Colorado.
211	Santo Domingo de Cundiyo		No estimate possible under description given.
212	Pueblo de Quemado	288,000	
215	Bishops Ranch	600	
227	Jose Ignacio Alari		Do.
228	Roque Jacinto Jaramillo		Same; partially tried.
257 263	San Jose de Garcia		No estimate possible under description given.
260	Juan Joseph Moreno		Do.
262	Francisco Xavier Romero		Do.
270	Sitio de Navajo		Do.
	Total	2,808,961	

B.—CASES TRIED, SUBMITTED, AND UNDER ADVISEMENT BY THE COURT IN NEW MEXICO DISTRICT.

P. L. C. No.	Name of grant.	Acreage claimed.
144 252	San Pablo y Nacimiento	131,000
168	Santa Teresa	9,681
203 213	San Joaquin del Nacimiento	131,725
	Total	272,406

C.—CASES IN WHICH MOTIONS FOR REHEARING ARE PENDING IN NEW MEXICO DISTRICT.

P. L. C. No.	Name of grant.	Acreage claimed.	Mover.
165 206	Abo mine	16,000	Claimants.

D.—GRANTS PENDING ON SURVEY IN NEW MEXICO DISTRICT.

P. L. C. No.	Name of grant.	Estimated acreage confirmed.
5	Arroyo Hondo	20,171
15	Antonio Sedillo	86,606.21
16	Gijosa	15,540.97
17	Canada de Santa Clara	1,342.08
24	Dona Ana Bend	29,323
31	Luis Jaramillo	18,000
43	Polvadera	35,000
55	Cevilleta	285,451.36
67	Felipe Tafoya	4,340
70	Las Lagunitas	43,653.03
75	San Mateo Spring	4,340
116	Talaya Hill	500
122 148	Penasco Largo	665
157	El Ranchito	8,000
179	Juan Bautista Valdez	1,200
205	Canada de Cochiti	15,000
229	Angostura	2,319
267	Santa Rosa de Cubero	5,000
272	Miguel and Santiago Montoya	2,600
273	Lo de Padilla	27,000
	Total	606,032.60

Cases on docket of New Mexico district not finally disposed of, etc.—Continued.

E.—CASES ON APPEAL FROM NEW MEXICO DISTRICT.

P. L. C. No.	Name of grant.	Acreage claimed.	By whom appealed.
20	Nerio Antonio Montoya	3,633	Claimants.
36	Bairds Ranch	33,696	Do.
44			
128			
135	Las Animas	4,096,340	Do.
154			
216			
71	Tres Alamos	43,384.64	Do.
87	Sierra Mosca	115,200	United States.
91	Alamitos	2,500	Do.
183			
99			
158	Petaca	186,977	Do.
233			
101	Ojo del Apache	47,743	Claimants.
108	Cebolla	27,000	United States.
111	Real de Dolores	17,361	Claimants.
112	Cuyamungue	5,000	United States.
130	San Jose Spring	100,000	Claimants.
182			
132	Reyes Pacheco	600	Do.
134			
184	Santo Domingo and San Felipe	20,000	Do.
185			
142			
204	Vallecito de Lobato	114,400	Do.
236			
152	Estancia	415,036	Do.
173	Embudo	25,000	Do.
264	Bartolome Sanchez	5,000	United States.
269	Las Huertas	150,000	Claimants.
274	Antonio Gutierrez	12,000	United States.
275	Joaquin Sedillo	8,000	Do.
	Total	5,428,876.64	

F.—GRANTS CONFIRMED, BUT CONFIRMATION NOT YET FINAL.

P. L. C. No.	Name of grant.	Acreage confirmed.
74	Canon de Carnue	1,000
107	Canon de Chama	2,736
114	San Jose del Ensinal	12,207
130	Jose Manuel Sanchez Baca	4,340
137	Santo Tomas de Iturbide	6,680
149	Fernando de Taos	1,000
150	Refugio Colony	26,130
193		
151	Mesilla Colony	17,361
194	Santa Cruz	1,000
	Total	72,454

RECAPITULATION.

Cases.	Number.	Acreage.
Not tried	12	2,808,961
Under advisement	3	272,406
On motion for rehearing	1	16,000
On survey	20	606,032.60
On appeal	21	5,428,876.64
Confirmation not final	9	72,454
Total pending in New Mexico district	66	9,204,730.24

DEAR SIR: I have the honor to transmit herewith my report of the condition of the cattle industry in the Territory of New Mexico for the year ending June 30, 1899:

The winter of 1898–99 was phenomenally severe and destructive to stock throughout the entire Western portion of the Union. New Mexico, in common with the rest of the range country, suffered, but not to the extent experienced in those sections exposed to the full fury of the storms and blizzards sweeping down from Manitoba, unobstructed until the northern boundary of New Mexico is reached, where the mountains trending to the eastward deflect the storms in that direction and they develop into the much dreaded northers of Texas, thus protecting our stock from the rigors of climate that caused such havoc among range cattle during the winter last past. Those that perished were mostly old and weak cows with young calves, during the late and very dry spring following. Taking the Territory at large, the loss was about 7 per cent, varying in different sections owing to local conditions. All, however, were thin in flesh, and not in shape to be handled, and for this reason very little trading was done during the latter part of the year, and the movement of cattle out of New Mexico for any purpose was about 70,000 head less than it was during the same period in 1897.

Since the summer rains set in, making feed and water plenty, and assuring a supply for the balance of the year, their recuperation has been wonderful, and by the time the forage crops have been harvested, the steers being well graded and perfectly healthy, cattle will be in fine condition to be handled by feeders, the most successful of whom requiring for their purposes certain approved forms and qualities in their build and breeding that are known to give the most satisfactory results in the finished product, and accepting in their selection such only and none other, determined the most progressive of our cattlemen to supply the demand for the class required, and to that end have for some time past, and more noticeably during the present year, been introducing into their herds the very best strains of beef-producing blood to be found for that purpose. More than two-thirds of the steer holdings, which are nearly all ones and twos, have not yet been disposed of. They are well graded and will make feeders that will be profitable to handle, and are taking on flesh every day, grazing on the rich pastures our wonderful gramma grass affords, and which now just seeding, besides giving growth, has also a fattening quality almost equal to grain, and by the time corn is in hand for feeding will be in the best possible condition to be finished for the slaughter. Our cattlemen expect and are entitled to receive remunerative prices for their product, and the present outlook is that they will.

The attempt to control prices of cattle in this Territory earlier in the season by syndicate methods did not greatly prevail, and with the immense corn crop that is now assured the demand for cattle to consume it will be constant and strong.

The fact that a great shortage exists in that class of property is absolute, and cattlemen can confidently figure for an increased demand for their product for years to come, and will best subserve their own interest by producing that class of cattle which will give the best results when placed in the feed lot.

No losses of moment, except those before mentioned, caused by severe weather, have occurred. Fatal contagion is unknown.

The united and vigorous action by cattlemen in those sections where cover for vermin is most abundant have greatly reduced losses among stock heretofore caused by the preying of wolves on young calves, and inspectors from all portions of the Territory report that the depredations of the rustling element in burning brands and driving stolen cattle out of the Territory has (owing to the repressive measures taken against them through the operations of this board) been greatly reduced; many of them have been caught and convicted, and are now undergoing punishment, while a greater number have fled the country, fugitives from justice.

In my report for the year ending June 30, 1898, attention was called to the capabilities as a stock-grazing country of the great plains of eastern and southeastern New Mexico, which had been hitherto undeveloped, a gigantic trust now being promoted, the scope of which is to include the capital syndicate, holding in excess of 3,000,000 acres of land in Texas and extending over 100 miles along the eastern border of New Mexico, and also to include nearly all of this whole beforementioned section, some 25,000,000 acres of public land in New Mexico, now being rapidly filled up by a valuable class of frontier cattlemen and their families, each owning small bunches of stock and who are exploiting its natural resources as a stock-breeding region, developing water by means of wells and windmills for their horses and cattle and domestic purposes.

This scheme, if consummated, will be disastrous for all these people, as they will

be overwhelmed with the herds turned loose on them, and must either abandon their holdings or submit to the terms made them by the trust, and it is clearly against public policy that this should be so, as a country occupied by people who make homes and pay their taxes are of more value to the State than are these grasping combinations, which notoriously and systematically avoid doing.

Reports from inspectors and leading cattlemen throughout the Territory are all to the effect that the present conditions of range and cattle are all that could be expected or desired; that the calf crop is much better than it seemed possible that it could be after the stress the exceptionally hard winter and dry spring put on the range stock; that a very decided improvement in the grade of young stock is shown throughout the Territory; that their owners being sure of their increased value and better protection are giving them closer and more intelligent attention than they have hitherto received.

From the most reliable data attainable there are in this Territory about 1,200,000 head of range cattle, out of which the steers are pretty closely sold. During the year ending June 30, 1899, 165,787 were sold and removed from the Territory—mostly steers to be matured and prepared for slaughter, the money value of which at current rates approximate $4,000,000. This, there is every reason to believe, will be increased by one-half at the end of the fiscal year, June 30, 1900.

All of which is respectfully submitted.

J. A. LA RUE,
Secretary of Cattle Board, New Mexico.

Governor MIGUEL A. OTERO,
Santa Fe, N. Mex.

REPORT OF SHEEP SANITARY BOARD.

SIR: We beg leave to submit to you the report of the sheep sanitary board of New Mexico for the year 1899;

Sheep growing is undoubtedly the principal industry of our Territory, and for the protection of this industry the sheep sanitary board was created by an act of the legislature of this Territory in 1897. Prior to this act the law in effect in regard to marking and branding and the illegal handling of sheep, and especially as to the treatment of the disease known as scab or scabies, was so defective as to be of practically but little value. During the first two years of the board's existence a great deal was accomplished in making growers become acquainted with the law in regard to dipping their sheep for scab, the necessary ingredients composing the dip, and the manner in which it should be used; and also in the creation of a corps of inspectors to enforce the statute and the rules and regulations of the board. The statute of 1897, however, was also found to be defective in quite a number of particulars, chief of which was inadequate provision for providing necessary funds with which to carry on the work contemplated. These defects have been remedied by the legislature of 1899, and the law is now in such shape that a great deal of good is expected to be accomplished during the next two years. Copies of this act of 1899 and of the rules and regulations of the board have been placed in the hands of every sheep grower in the Territory of whom the board has knowledge, both in English and Spanish.

During the first part of the present year a general drought prevailed throughout the Territory, and the dipping and quarantining of sheep were suspended, as their continuance during a time of scarcity of grass would certainly have caused an immense loss. Rains have, however, prevailed for some time, and a general order has been made by the board, a copy of which, either in Spanish or English, has been mailed to every sheep grower in the Territory, providing that all flocks shall be dipped before the 15th of September, and again before the 15th of December. This order the board will through its inspectors strictly enforce, and it is believed that in the spring of 1900 the sheep in this Territory will be quite clean of scab. A copy of that order is inclosed herewith.

The Department of Agriculture of the United States has recently promulgated a regulation providing that any sheep affected with scab or scabies, or sheep that have come in contact with those so affected, shall not be allowed shipment from one State or Territory into another unless they have first been dipped in one of two mixtures, the formulas for which are prescribed by the Department. Of the two formulas specified the lime and sulphur mixture is practically the same as that set out in the rules and regulations of the board, except that it is not quite as strong. The board has had a large number of copies of this regulation printed, both in English and Spanish, together with a statement of the board that it

intends to assist the Department of Agriculture in every manner possible in enforcing this order, and with a further order of the board that all sheep shall be dipped as before stated herein, with one of the formulas prescribed by the Department of Agriculture. It is the intention of the board, and it has so instructed its inspectors, to see that all sheep growers comply with this regulation in every particular, and it is our desire to cooperate with the Department of Agriculture and assist in every manner in our power in destroying and curing the disease known as scab or scabies.

The natural adaptability and advantage of the Territory of New Mexico for sheep growing are unsurpassed by any country or section of country in the world. The only disease we have to contend with is scab, before referred to, foot rot and other diseases being unknown. With scab eliminated, as the board hopes and intends that it shall be, nothing can interfere with the rapid development of this industry to five or six times its present great magnitude, and the consequent increase of richness and prosperity to the Territory.

From what data we have, we can safely say we have between 4,500,000 and 5,000,000 of sheep, which produce on an average of not less than 5½ to 6 pounds of wool each, and this average is constantly being increased by the grading up of our sheep by the importation of fine rams.

At the present time growers are rapidly having their marks recorded with the board, which give them exclusive right to the use of their mark and fire brand as recorded, and will enable the board through its inspectors to quickly identify and return stray or stolen sheep, two flocks of stray sheep having been by this means restored to their proper owners within the last three months. The cutting of a flock or the stealing of sheep will, under our statute in regard to defacing or mutilating marks, soon be a thing of the past. The board is cooperating with the authorities in seeing that all sheep thieves are prosecuted and an owner of sheep in this Territory will soon be as safe from any trouble of this nature as owners who keep their flocks in pastures in Eastern States.

The following is a list of our range and shipping inspectors at the present time: Crestino Griego, Casa Salazar; Francisco Montoya, Bernalillo; William McIntosh, Chilili; Ricardo Lewis, Albuquerque; H. M. Miller, Roswell; A. T. Gunther, Lower Penasco; C. C. Martin, Roswell; S. Floersheim, Springer; H. C. Abbott, Springer; Oscar Troy, Raton; W. Kelly, Catskill; C. W. Lewis, Eddy; J. M. Abercrombie, Anton Chico; Antonio Jose Aguilar, Anton Chico; Mariano Montoya, Revuelto; John Coleman, Liberty; David Crespin, Los Colonias; L. C. Churchill, Puerto de Luna; M. F. Davidson, Richardson; L. B. Walters, Lincoln; Epimenio Martinez, Wagonmound; G. W. Bond, Wagonmound; S. E. Ruckner, Watrous; Pedro Aguilar, Tularosa; T. J. Key, Tierra Amarilla; Sixto Chavez, El Rito; Manuel Gomez, Lumberton; Charles Pinkney, Farmington; Rafael Gallegos, Las Vegas; Carlos Martinez, Chaparito; J. E. Whitmore, Gallinas Springs; Nicolas T. Cordova, Las Vegas; Fecundo Pino, Galisteo; Andres C. de Baca, Romero; John Pflueger, Lamay; Frank Bond, Espanola; Melcor Silva, Monticello; B. F. Parks, Lave Valley; Manuel S. Pino, Datil; H. A. Brachvogel, Cienega; Matias Contreras, Lajoya; J. S. McTavish, Magdalena; Albert G. Muller, Taos; Juan A. Bernal, Cerro; T. A. Gray, Clayton; Rafael Tixier, Bueyeros; J. C. Martinez, Folsom; Sylvestre Miribal, San Rafael; Jose Salazar, Peralta; Antonio A. Salas, Pinos Wells.

The sheep sanitary board as at present constituted consists of Solomon Luna, president, Los Lunas; W. S. Prager, vice-president, Roswell; and Harry W. Kelly, Las Vegas, N. Mex., and Harry F. Lee, secretary, with office of board at Albuquerque, N. Mex.

IMPORTANT ORDER.

ALBUQUERQUE, N. MEX., *August 19, 1899.*

To the Sheep Growers of the Territory of New Mexico:

You are hereby notified that all sheep which have not been dipped since the 1st of June, 1899, must be dipped between now and the 15th of September, using one of the formulas prescribed by the United States Government as set out in the regulations below, or with the lime and sulphur formula heretofore prescribed by this board in its rules and regulations. You are also notified that all sheep will be required to be dipped again after the 15th of October and before the 15th of December, 1899.

Any sheep owner who fails or neglects to comply with this order will be subject to a fine of 1 cent for each and every head not so dipped, and the respective inspectors for the various counties have been ordered to strictly enforce this order and to collect such fines, and to have all sheep not so dipped as above ordered

dipped at owner's expense. And in event of any flock still showing scab after having been dipped twice, the dipping must be continued until the scab is entirely cured.

The circular from the United States Department is as follows:

UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., July 20, 1899.

Whereas the shipment of live stock affected with any contagious, infectious, or communicable disease from one State or Territory to another, or from any State into the District of Columbia, or from the District into any State, is prohibited by the act of Congress approved May 29, 1884; and

Whereas the contagious disease of sheep known as scabies, or scab, exists in many parts of the United States, due notice of which was given in the Department order of June 18, 1897; and

Whereas some of the preparations in which diseased sheep have been dipped by owners and stock-yard companies with the object of destroying the contagion and making legal the shipment of said sheep in interstate trade have proved inefficient, and said sheep have disseminated the contagion notwithstanding such treatment; and

Whereas the damage and losses from scabies in sheep have been in some sections very heavy and discouraging to those engaged in the sheep industry:

It is ordered that from and after August 10, 1899, no sheep affected with scabies, and no sheep which have been in contact with others so affected, shall be allowed shipment from one State or Territory to another, or from any State into the District of Columbia, or from the District into any State, unless said sheep shall have first been dipped in a mixture approved by this Department.

The dips now approved are—

1. The tobacco and sulphur dip, made with sufficient extract of tobacco to give a mixture not containing less than five one-hundredths of 1 per cent of nicotine and 2 per cent flowers of sulphur.

2. The lime and sulphur dip, made with 8 pounds of unslaked lime and 24 pounds of flowers of sulphur to 100 gallons of water. The lime and sulphur should be boiled together for not less than two hours, and all sediment allowed to subside before the liquid is placed in the dipping vat.

The owner of the sheep is privileged to choose which one of the above-mentioned dips shall be used for his animals. The Department will instruct inspectors to enforce due care in dipping sheep, but it assumes no responsibility for loss or damage to such animals, and persons who wish to avoid any risks that may be incident to dipping at the stock yards should see that their sheep are free from disease before they are shipped to market.

J. H. BRIGHAM, *Acting Secretary.*

The above regulation has recently been sent out by the United States and is now being strictly enforced, and all persons who fail to dip their sheep in exact accordance with the above regulation and in every manner fully comply therewith make themselves liable to the United States. Sheep men are notified and warned that they must strictly comply with the above regulations or they will be liable for damages.

SOLOMON LUNA,
President Sheep Sanitary Board, New Mexico.
HARRY F. LEE,
Secretary, Albuquerque, N. Mex.

Hon. M. A. OTERO,
Governor of New Mexico.

SHEEP.

That "the hoof of the sheep is golden" has been demonstrated conclusively in New Mexico. Not even Australia, renowned the world over as the sheep-grower's paradise, can surpass New Mexico in its advantages as an ideal sheep breeding and wool growing section. The master hand of nature lavishly supplied our Territory with everything requisite for the successful pursuit of the sheep and wool industry. Nature endowed her with a peerless climate, neither hot

nor cold, yet overflowing with sunshine from January to December, producing an atmosphere pure, ozone laden, and invigorating.

Her grazing lands extend from the plains and mesas to the top of the mountains, 10,000 feet high and bountifully covered with nature's choicest nourishment—gramma grass—which retains to a surprising degree its succulence and nutrition, even when only cured by wind and weather where it grew, with no assistance from mankind.

New Mexico's natural adaptability to sheep raising and wool growing was recognized by the Spaniards when they settled in this section about three hundred years ago, and they introduced large numbers of Merino sheep, which soon became the principal support of the people, furnishing them with food and raiment. Since that time this industry has a prominent position in the Territory and it is to-day, as it has been for many years past, the most important and profitable in New Mexico. At this time there are owned in the Territory of New Mexico over 4,000,000 head of sheep, including the lambs grown this year, and, with the exception of one State possessing many similar advantages, our Territory towers above all other States and Territories in the number of sheep owned. The original stock was of the Spanish Merino type of sheep, and from lack of fine-bred rams to keep up and improve the strain they gradually deteriorated in character until they became a class unto themselves, displaying more of the characteristics of wild than of domestic animals. This trait developed in these sheep an ability to hunt for their food and enable them to subsist upon the scanty herbage and to live without water for many days, whenever conditions demanded or necessitated such modes of living. To-day, though improved by the best blooded stock to be found, they still possess these desirable characteristics.

The ewes make splendid mothers, caring for their lambs in a manner unequaled by any other breed of sheep and fearlessly defending them against attack by carnivorous wild animals. Their fecundity is also remarkable, and there is always a high percentage of lambs born, running up, in some flocks, over 100 per cent. Possessing such qualities, the increase and growth of the flocks is very rapid.

With their inherited and acquired knowledge of the sheep business, it would be difficult to find in any other section of the country a class of growers who can excel the New Mexican sheep men in the intelligent and economical management of their herds. In the improvement of their flocks they have experimented with different breeds, and the results have convinced our best sheep men that, for the conditions prevailing in New Mexico, the American Merino (the Delaine or Rambouillet types) is superior to all other breeds tried, and for the purpose of raising the standard of their sheep they have imported many fine-bred rams from Vermont, Pennsylvania, Ohio, and Michigan, for some of which as high as $100 per head was paid. The fine types are peculiarly suited to New Mexico, not simply because they are wool and mutton sheep, but for the reason that sheep in our Territory are grazed upon open ranges, and it is therefore essential that the sheep should possess the quality of herding together, and this is a leading trait of the Merino. Some of the long-wooled mutton breeds have been tried, but as these sheep will not stay "bunched" while feeding it is very difficult to herd on the open ranges, and their decided tendency to wander off singly demands unceasing vigilance as well as hard and tiresome work on the part of the herders to hold them together, while the danger of loss from this cause is always

serious, and these sheep are not well suited, therefore, for open-range grazing.

The Rambouillets, however, being of pure Merino descent, have inherited the flocking qualities of their ancestors and they are a desirable class for range work. They are free from wrinkles, the wool produced is the finest quality, and they make excellent sheep for mutton purposes. We do not know whether it is due to the climate, to the gramma grass, or to the breeding, yet the fact remains that the mutton from New Mexico sheep possesses a sweetness, tenderness, and delicacy of flavor that places them easily in the front rank as choice mutton sheep. These qualities are so well known that "feeders" prefer them to any others, and the demand for them for feeding pens is so great that the growers are only partially able to supply it. Nearly a million head of sheep are annually taken to Colorado, Nebraska, Kansas, Missouri, and Illinois to be fattened for market.

Fort Collins, Colo., received large numbers of them, and the high price the feeders obtain for their New Mexico sheep demonstrates their superiority as mutton producers. The sheep make splendid feeders, as they will eagerly and greedily feed upon alfalfa, oats, corn, wheat screenings, etc., and take on weight very rapidly. Their faculty for adapting themselves to existing conditions makes them very desirable animals for feeders, as they are as much at home in the pens as they are upon the ranges. Sheep are also being fattened around Eddy, N. Mex., upon the sugar-beet pulp, and the sugar factory there is now able to advantageously dispose of what was formerly a waste product. Results from pulp feeding have been very satisfactory, particularly in the case of old ewes. The pulp furnishes them with an abundant supply of rich milk, and they are thus enabled to raise strong, well-developed lambs.

No business offers more profitable returns than does the sheep-raising and wool-growing business of New Mexico at the present time. The cost of running the sheep for a year is about 30 cents per head, which covers the expense of herding, lambing, shearing, dipping, taxes, etc. The cost of shearing amounts to 2½ to 4 cents per head, according to the class of sheep shorn. The flocks are usually run in bands of 3,000 to 5,000. The people of New Mexico are unsurpassed in the management of sheep herds. It is no unusual thing for them to take sheep on shares, agreeing to return double the number of young and healthy ewes at the end of five years, with a considerable amount of wool annually; and often, after the five years, the party, on repaying, has double or treble the original number left for himself. The flocks require three men, or two men and a boy, and two or three dogs, and, when the same man has three or more flocks, another man of experience as overseer. Each flock also has a donkey and camp equipage, which, with the rations, are carried on the donkey. The sheep are grazed from place to place within the range. The men and dogs constantly remain with the sheep during the whole year.

A few years ago sheep could be bought for 75 cents per head, and even at that price there were few buyers. To-day ewes are selling freely from $3 to $4 per head; yearlings (wethers), $2.50 to $2.75; two years and up (wethers), $3 to $3.25, and six months' old lambs from $1.75 to $2.25 per head.

One of the prominent sheep men of New Mexico, who started in business about twenty years ago with practically no capital, has just disposed of his business and finds himself worth over $100,000, not-

withstanding the fact that he, in common with the other sheep men, lost money for several years during the agitation for and the life of the obnoxious Wilson bill. The following statement will briefly show about what can be done in the sheep and wool industry in the Territory of New Mexico. This is the way it works:

4,000 ewes, at $3 per head	$12,000	
Expenses for one year, say, 50 cents per head	2,000	
Total cost		$14,000

At the end of one year you have:

3,800 ewes (5 per cent loss allowed), at $3	$11,400	
21,000 pounds of wool, at 12 cents	2,520	
3,100 lambs, at $2	6,200	
		20,120
Profit		6,120

Fifty per cent on the original outlay is a handsome return from any enterprise, and we believe we do not err when we reiterate that the people engaged in sheep husbandry in New Mexico are following the most profitable business in the West to-day, and as long as a protective tariff guards their interests the prospects and outlook for the future are certainly very bright for the sheep men, and the prosperity of the Territory is in a very large measure commensurate with the success enjoyed by those who are devoting their capital, brains, and energies to this important industry.

WOOL.

The wool clip of the Territory will amount to fully 18,000,000 pounds this year. A few years ago the average weight per fleece was very low, but now, owing to improved breeding, it will amount to a little over 5 pounds per head. The wool grown in New Mexico is of a diversified character, scaling from the finest Delaine-Merino to the coarsest carpet. The improvement in the grade of the wools has been coincident with the improvement in the sheep, and the growers are still exerting themselves in the laudable ambition of bringing their flocks and wool up to a still higher standard of quality. Many years are consumed in breeding the coarse-wooled stock up to the desired Merino plane, and so to-day, while clips are shorn that will compare favorably with any in the United States, the majority of them are not uniform in grade, but will contain fleeces producing sorts running from fine to carpet wool. The lambs of each succeeding year produce a finer grade of wool, and in time, if the growers continue to use fine Merino rams, the wool clip of New Mexico will be composed of fleeces uniform in grade and of choice character.

There is an ever-increasing scarcity of fine wool in the world, due to the crossing of the fine-wooled flocks with the large-framed, coarse, long-wooled breeds. The tendency to breed exclusively for a large carcass has amounted almost to a craze all over the globe, from which the New Mexican growers have been comparatively free. They have again displayed their intelligence by directing their efforts solely to the production of fine-wooled mutton sheep, and the certain advance of fine wools to a high point will amply reward them for their foresight and labors.

The following tables, furnished by one of the large wool-scouring

plants situated at Las Vegas, indicate the diversity in the wool clips grown in the Territory:

A clip of 40,000 pounds of grease wool yielded:	Per cent.
Scoured fine wool	65
Scoured fine medium	35
A clip of 90,000 grease pounds yielded:	
Scoured fine and fine medium	97
Quarter-blood	2
Blanket	1
A clip of 77,000 grease pounds yielded:	
Scoured fine and fine medium	90
Quarter-blood	9
Blanket	1
A clip of 31,000 grease pounds yielded:	
Scoured fine medium	2
Three-eighths	59
Quarter-blood	17
Blanket	18
Carpet	4
A clip of 20,000 grease pounds yielded:	
Scoured three-eighths	43
Quarter-blood	31
Blanket	16
Carpet	10

There are many clips that will show a much greater percentage of the low sorts (blanket and carpet) than is indicated in the tables quoted above.

The advance in the price of wool has kept step with that of the sheep. In 1896, when sheep were only worth 75 cents per head, the price of wool touched its lowest point. Eastern commission houses even refused to make any advance on grease wool, and owners were offered 3 to 5 cents per pound for the fine clips. To-day these wools are worth 11½ to 14 cents per pound, and the importing price of wool has not yet been reached by 2 to 3 cents per pound. Light shrinking wools sold as high as 17½ cents last fall; all of which tends to prove that a protective tariff on wool is neither a myth nor a fallacy, but is essential and beneficial to the wool industry of New Mexico, as elsewhere in the United States.

The production of such a vast quantity of wool has brought within our borders another important industry, the business of scouring wool, as well as of sorting it and otherwise preparing it for the manufacturers' use. Three large plants have been erected at Las Vegas. There is also one located at Albuquerque. There is in addition to these a scouring plant at Trinidad, Colo., across the New Mexican line, which handles large quantities of wool grown in northern and northeastern New Mexico. The town of Eddy is at present contemplating the erection of a wool-scouring mill, and if the water proves suitable for this business they hope to have it running by next wool season.

These scouring mills have been the prominent factor in securing for the growers full prices for their clips. The benefits they confer upon the sheep men are numerous. Their presence and anxiety to secure wool has developed a competition among buyers that has reacted to the growers' benefit. The scouring of wool at home results in a big saving in freight charges, as all the grease and sand carried by the wool is eliminated, and transportation charges are only paid on clean wool. They are a school for the growers, as they teach them the shrinkage of the wool and the percentage of the various sorts taken from it; and, as all wool is bought and sold on a scoured basis,

it is very necessary that they should possess this information, as it enables them to dispose of their products intelligently and to good advantage. If wool is consigned to an Eastern commission house to be sold, the charges are less for handling scoured wool than for grease wool, the growers have more money to spend at home, and their support of the scouring mills keeps employed in New Mexico much capital and many hands. The benefits of scouring mills to a community are fully illustrated in the case of Las Vegas, which is to-day the best wool market in the Southwest, and wool is shipped to that point from the most distant parts of the Territory, the growers being attracted there by its excellent outlet for wool. If the grower sells his wool to an Eastern buyer in the grease he has to pay the freight as well as the charge for scouring the wool, as he well knows, and if he can save the money paid for hauling the grease and dirt in his wool, it is certainly to his interest to do so. It is also better for the Territory to have this work done here, as it encourages an important industry here and adds to the wealth of New Mexico. That the conversion of the wool just as it comes from the sheep's back into the condition required by the manufacturers has been remunerative to the growers is demonstrated by the following letters, which were received, with numerous others of similar import, by one of the leading scouring mills at Las Vegas, N. Mex.:

PUERTO DE LUNA, N. MEX., *January 17, 1898.*

——— ———:

In reply to your letter of the 10th instant, I have to say that I want you to scour my wool, as you have done for many years.

I have learned by experience that the reputation of your company in the wool market of the East is such that wool sorted and scoured by it sells for the highest market price; and in regard to my wool, when you scour it, and I see the market quotations for scoured wools, I know exactly what it is worth, and I believe the owners of fine wool can realize more by scouring than selling in the grease. For instance, two years ago, when you scoured it, I realized, after all expenses had been paid, $1,668.48 over the highest price I was offered for it in the grease.

I often hear it asserted that in New Mexico and Arizona we can not raise such wool as is produced in Montana and Northern States, and it may be true; but, nevertheless, I have received for every clip you have scoured the past six years the same price, and I think I owe something to your company for the thorough manner it was sorted, scoured, and put up, and I am going to stay with you.

Yours, truly,

J. G. CLANCEY.

P. S.—I hope to have over 100,000 pounds this coming clip.

CHILILI, N. MEX., *January 17, 1898.*

——— ———:

We are very well satisfied with the manner in which you handled our clip last year and the price you got for us. It is our intention to place this spring's clip, which will be in the neighborhood of 200,000 pounds, in your hands again, as we believe all fine wools should be handled through a scouring mill, as there is a big saving in freight and in the commission charged for selling the wool. We are convinced that we can get more money from our clip in this manner than if it is handled or disposed of in any other way.

Yours, truly, MCINTOSH & MCGILLIVRAY.

The sheep business of New Mexico has also resulted in the establishment of another enterprise at home, viz, that of wool pulling and tanning. There are located at Las Vegas two wool-pulling plants, one of which is also engaged in the tanning of leather. The processes through which a sheep pelt goes from the time it is taken off the carcass until it is converted into leather are many and interesting. When the pelts are received by the puller they are soaked in tanks filled with

clear, soft water. When the skin is thoroughly softened, the water is drained off, usually in hydro-extractors. If what is known as the sweating process is used, the pelts are then suspended from the tenterhooks in closed rooms called the sweat houses. Steam is introduced, and the chemical action produced by the heat upon the skin causes the wool to be easily removed from the skin after having been sweated for about forty-eight hours. The use of depilatories is largely supplanting the sweating method. In this case the flesh side of the pelt is painted with a solution of the depilatory. The pelt is folded and laid away for from five to twelve hours, according to the season of the year and the strength of solution, after which the wool can be pulled from the skin with great ease, the depilatory having destroyed or eaten the roots of the wool fibers. As the pullers remove the wool they sort it into different classes belonging to pulled wool, which are technically known as extras, fine super, A super, B super, and C super. The pelt from which the wool has been taken is now termed the "slat," and it is then put through the process of liming, beaming, bating, or drenching. At this stage, if the puller is also a tanner, the slat goes to the tanning department, whence it finally emerges as leather. There are about twenty different processes for tanning slats, the four principal ones being the chrome, the oil, the bark, and the alum. If the puller does not desire to tan the slats, he proceeds to pickle them, in which state they can be kept for a long period, or they may be sold to those who tan the slats only and do not engage in the preliminary work of pulling. The work of pickling is performed in order to preserve the slats in good condition for tanning when they are not tanned immediately after the bating process.

The location of these plants within the Territory supplies the growers with a splendid home market, just as the wool-scouring mills furnish him with an unsurpassed outlet for his wool clip. New Mexico pelts have an enviable reputation for their leather-making qualities. Eastern tanners prefer them to all others on account of their fineness of grain and toughness, and they are largely used in the production of imitation morocco and other leathers, as well as for glove stock, for which they are eminently suited. If the butchers and herders will exercise proper care in removing the pelt from the carcass and curing it afterwards, they can obtain fancy prices for them. Pullers and tanners have complained at times that excellent skins have been ruined for leather purposes by reason of careless skinning and handling in the primal stages, an objection that should and can be easily remedied by the exercise of intelligence and care on the part of those who skin the animals and prepare the pelts for shipment to the pullers.

The wool and sheep industry continues to be the most important in the Territory, and the flock masters are in a more prosperous condition than they have experienced for many years. The past winter and spring have not been surpassed in severity for the last fifteen years, and caused some losses among the flocks, besides reducing the lamb crop below the normal percentage, but the high prices which sheep and wool have commanded this season have obliterated the effects of the early losses, and the industry is one of the most profitable in the country. Its healthy and prosperous condition is evidenced by the number of people who are purchasing sheep and ranches in different sections of the Territory. The excellent demand for New Mexican sheep for "feeders" tends to prevent overproduction, and the number of sheep in New Mexico to-day is about the same as at this time last year, viz, fully 4,000,000. Wool brought good prices

this season. In fact, the amount netted from the sale of their clips paid the growers a handsome dividend on the capital invested in their business, regardless of the value of the lamb crop. Wools sold for 12 to 15 cents per pound. This was equal to 60 cents to $1.25 per head, according to the weight of the fleeces, and as 30 to 60 cents per head will cover all the expenses incurred in the sheep business for one year, half of the wool clip was clear profit to the grower.

From the statistics of the wool production of New Mexico, by parties who are thoroughly acquainted with the wool markets of that Territory, the following table is compiled of the amounts handled by the several places in the Territory direct from first hands:

	Pounds.
Las Vegas	6,000,000
Albuquerque	2,500,000
Chama, Espanola, Terra Amarilla, Tres Piedras, and Antonita district	2,500,000
Clayton	1,500,000
Wagon Mound	1,000,000
Springer	1,000,000
Eddy and Roswell and Pecos Valley points	1,000,000
Belen	750,000
Santa Fe	250,000
Watrous	100,000
Balance of Territory	2,000,000
Total	18,100,000

It will be observed that Las Vegas heads the list with 6,000,000 pounds. In addition to this, between 3,000,000 and 4,000,000 pounds of the wool received from first hands at other places is handled by Las Vegas dealers, or through them, making the total amount of wool handled by Las Vegas merchants between 9,000,000 and 10,000,000 pounds, valued at over $1,250,000. Of the 2,500,000 placed to Albuquerque's credit, over half comes from first hands direct to Albuquerque, the balance coming in from points on the Atlantic and Pacific. In addition to this, Albuquerque dealers handle between 1,000,000 and 2,000,000 pounds from other points, so that the total amount that can be placed to the credit of Albuquerque dealers and commission men as handling would amount to perhaps 4,000,000 pounds.

A good deal of wool was handled at Chama this season, the amount being estimated at about 1,500,000 pounds. There is very little of it held back in Rio Arriba County. Prices were satisfactory. Upon the whole, people of the county of Rio Arriba have done very well during the past season, and are contented and happy.

GREAT MONEY EASILY MADE IN CATTLE AND SHEEP BUSINESS.

A number of lines of business in which large gains are now realized have been mentioned in different parts of this report. And what many are now doing many more could do, for one beauty about New Mexico is that an investment here is not simply one nail driving out another. Every department of industry and enterprise has abundant room for many additions, the newcomers doing as well as the old, and the old suffering no competition from the new. Were the stock investments of New Mexico doubled in value by the addition of new ranges and new animals, the old interests would not be damaged a particle, since the return on investment in this industry is determined by the condition throughout the nation. So with the production of wool and hides and pelts. For those having the means

and somewhat of experience, the cattle or sheep business offers a field of almost limitless opportunity and vast profit, either in the purchase of present ranges or the development of others, should breeding be proposed; or in the purchase of lands and development of new ranches, should feeding and fattening be contemplated.

These enterprises require, of course, a considerable outlay of money in the purchases of stock and ranches, though the ranges are practically free, the location or development of water placing the surrounding unwatered lands at the use of the locator. But similar stock industries can not be entered upon elsewhere and to the same extent with less money, nor will the returns elsewhere be so satisfactory. Because of winter mildness, maintenance is less costly, and because of climatic excellence losses are fewer and increase is at a much larger ratio. The stockbreeders' Elysian fields lie in New Mexico.

GEOLOGICAL ASSOCIATIONS IN NEW MEXICO MINING CAMPS.

SIR: In accordance with your request, I transmit herewith a short account of the geological associations prevailing in a number of the mining camps in the Territory. While the data incorporated in this report are not all strictly of an economic nature, it is hoped that they may prove of practical service in the hands of intelligent mining men by aiding as much in the avoidance of unnecessary expenditure as in the direct exploiting of the mines. These data are derived from the work of the geological survey of the University of New Mexico, and form a part of the material to be published in extenso in the second volume of the report of that survey now in course of preparation.

Notes on economic geology of New Mexico.—It may be premised that the Territory of New Mexico is of so enormous extent that it follows as a natural consequence that its geological and economic relations differ in its different portions so entirely that the work done in any given area is no sufficient guide for work in other portions. It is necessary to carry the minute study of the formations into every section of the Territory before reliable generalizations can be formed.

The work has proceeded far enough, however, to enable us to deduce a number of general principles, which if they had been recognized a few years ago would have saved an enormous sum to the Territory, and would have done much to have conserved her good name as a mining country.

In spite of the diversity in details, the Territory is sufficiently homogeneous geologically to enable us to treat it as one geologic terraine. Most characteristic of the geological features of the section is its newness. For the most part the rocks which cover its surface and determine its topographical and economic character date from recent geological ages. The latest of the great geological cataclysms, the descent of the glacial ice sheet, has scarcely affected the Territory directly in any part. It is true that there are evidences of local glaciers in a few places and that the valley of the Rio Grande is, in its upper courses, to some extent filled with material that may have been transported by the floods from the melting ice of the continental glaciers farther north, but otherwise the Territory is innocent of the wonderful glacial phenomena of the Northern States. The effect of this escape from the educating effect of the "great, cold, continental sorrow" is discoverable in a crudeness of topography, an angularity of outline, and unretentiveness of soil that has a very important effect on the economic development of the Territory. As an acute observer said many years ago, Arizona and New Mexico are the best drained parts of the United States. The effect of the ice sheet was to pulverize impact and to fill with impervious basins lined with clay the vast thickness of soil it produced. In New Mexico the soils are either due to the disintegration of the rocks in place or to the collection of débris carried by streams.

This fact, in connection with the loose and friable texture of the recent rocks so largely making up the surface deposits, tends greatly to facilitate the escape of the waters from precipitation and from incoming streams. Nor is this simply a curious fact, for it is fraught with tremendous import. In various parts of the Territory, with similar climatic conditions, entirely different crops are demanded. Potatoes will grow in one canyon and not on the opposite side of the same range or in an adjacent canyon. This lack of homogeneity in the soils of the Territory is seen equally in the nature of the plants naturally growing in different places at the same altitude, and makes necessary a minute study of the soils from a geological point of view all over the Territory.

The climate, in like manner, reflects the soil conditions. No one has sufficiently emphasized the effect of soil in determining the climate of New Mexico. It may be confidently stated that there is enough rainfall to insure the growth of crops in many if not most parts of the Territory without irrigation if only the soil were sufficiently retentive to hold and utilize the precipitation. To this may be added the well-nigh demonstrated probability that if the soil were more retentive, this in itself would tend to increase and distribute the rainfall. In this fact there is hope, for if sufficient pains are taken to preserve and extend our forest areas and to increase the cultivated lands, we may hope for a gradual modification of the climate and a tempering of the violence of the storms and greater distribution of precipitation. It has been possible to show that the local rains of this Territory are extremely sensitive to the radiant heat from the surface beneath, so that a bare extent of sand will actually ward off rains which fall about it.

The oldest rocks in the Territory known to the writer are granites and gneisses, which are generally only visible where the overlying rocks have been removed by erosion or faulting. Large areas of granitic rocks, however, are exposed in the northern part of the Territory, and in them are found quarries of mica, while they afford a good association for the metals when penetrated by basic rocks of later date.

These granites are exposed in the ranges bordering the Rio Grande south of Santa Fe, where they lie unconformably below a quartzite of varying thickness, and this, in turn, supports the great Carboniferous limestone series, which here attains a thickness of over 700 feet. The age of the granite has been a matter of controversy, but it is certain that it is metamorphic and represents some formation older than the Subcarboniferous. Beds of metamorphic limestone have been found in the midst of the granite.

The contact between the Carboniferous limestone and the quartzite (the place of which is sometimes taken by other modifications, such as a coarse conglomerate with pebbles from the underlying granite) is quite frequently impregnated with iron, and when this is the case the iron often forms a precipitant for copper. Such accumulations occur in the mountains of Postcarboniferous age along the Rio Grande Valley in the Oscuro, San Andres, Organ, Caballo, and other ranges. Veins in the limestone admit solutions of various substances which penetrate to the quartzite or granite, and at that point, in the presence of air and water, the iron reduces or precipitates the copper. Thus have been formed local deposits which are richest on the exposed surfaces and make a fine showing. The ore is of chalcocite, cuprite, melaconite, malachite, and azurite, and is often very rich. All these deposits are, however, fickle and superficial, and, while they may reward small capital, are rarely of sufficient extent to warrant great expenditure.

The source of much of the copper in the Territory is, however, to be found in a formation above the Carboniferous and only separated from it by the obscurely-defined Permean formation (which latter consists of limestones, shales, and sandstones assimilating with the Carboniferous below, and in some cases apparently passing by gradations into the Jura-Triassic). This formation (the Jura-Trias) is composed for the most part of red or maroon shales and sandstones, often attaining great thickness, but in central New Mexico usually limited to a few hundred feet. Although nearly devoid of fossils, this sandstone frequently contains large trunks of trees as well as leaves and branches which, in some cases, are fully silicified, while in others they are changed to coal, and in still others the carbon has been substituted for by copper. The latter process is easily intelligible chemically if water charged with copper in solution were present during the decomposition of the organic matter. These beds of vegetable matter accumulated in shallows of the ancient sea and form lens-shaped masses usually of no great extent. In some cases large trunks are fully transformed to copper ore, while in others only part of such a trunk is so transformed, In still other cases nodes or concretions of copper accumulate in shales of this series. There has usually been surprisingly little alteration in the copper in these shales, and the nodules then consist of pure copper glance or a mixture of the glance with iron. The Jura-Triassic sandstones are widely distributed and are easily recognized by the red color, and the occurrence of copper in the beds is almost as widespread as that of the formation. Such deposits occur at different places along the east side of the Rio Grande from the San Andres Mountains northward and are continued into the Mora region, also in the Jurassic deposits west of the Cochiti and thence westward. In some cases the strata are tilted and the alternate soft and hard layers leave long parallel ridges of the indurated sandstone that have been mistaken for igneous dikes and have led to an entirely wrong idea of the nature of the ore bodies.

The following formation is the Cretaceous, which is represented by a vast series of yellowish and gray shales and sandstones. The latter often afford available building stone, while the shales are in a number of widely-separated basins interstratified with coal seams. Above the Cretaceous or unconformably deposited about its eroded and faulted edges are the marls, clays, and sandstones of the Tertiary age. In these beds there are few elements of economic importance aside from clay for brick. The Tertiary beds tend to be strongly modified by proximity to other older rocks, or rather they are composed of the débris from the destruction of their predecessors, and accordingly assimilate in composition and appearance to the parent rock. Thus, in a region underlaid by Jurassic rock, the Tertiary may assume the same red color, and in the vicinity of the great lava flows the materials of the Tertiary are largely or wholly derived from the products of eruption from these craters, as may be seen in the vicinity of the tufa flows of the Cochiti. Material for excellent brick has been found in the dark blue shales of the Cretaceous, as at Las Vegas, but for the most part the fictile clays must be sought in the products of river erosion. A curious exception is afforded by certain Carboniferous shales and fire clays east of Socorro and in the product of alteration of andesite and other basic rocks, where they have been covered by trachytes and other acid rocks. The reaction between these rocks in favorable circumstances produces a kaolinization of the feldspar and a removal of other ingredients, leaving fine white china clay as a result. Such beds are to be seen in Socorro Mountain and elsewhere.

The most important storehouses of the precious metals are found in the igneous or volcanic rocks of the Territory. From this list must be eliminated the last and most conspicuous class of such eruptives—the basalt flows of Post-Tertiary age. A very large part of the Territory is dotted with craters, from which the lava sheets have spread for many miles. This basalt is later than, and so covers, rocks of all ages, except the deposits of the rivers. Where the underlying soft rocks have been undermined by percolating water, as has often occurred, the sheet breaks down irregularly under its own weight and produces what is aptly called "mal pais," or bad land. No substance of economic importance has been found in these basalts, though they are rich in iron, and the heat evolved by the thin sheets has been insufficient to be instrumental in the segregation of ores from other rocks.

The remaining igneous rocks may be grouped into three general classes of intrusives—the andesite series, the trachyte series, and the rhyolite series. The first and oldest of these is the class of basic eruptives, mostly dark-bluish or brown rocks, with white crystals of feldspars mottling the homogeneous background, and, when these crystals are conspicuous enough, constituting what the miners call "bird's-eye porphyry." This rock is one of the most general sources of gold—that is, it almost constantly forms the country rock or is in some way associated with the gold ores. It is true that the andesite is not in itself a suitable rock in which to seek appreciable quantities of the precious metals, but when it has been greatly influenced by the quartziferous later intrusives, so that it is shot through and through by dikes of felsite or quartz, or where flows of these other rocks are interbedded with the andesite, the segregation of more or less of gold and silver may be said to be the rule. This is a fact that will be of the greatest possible help to the prospector as well as the mine reporter.

It is not always easy for the untrained eye to distinguish the andesite from other dark rocks with porphyritic inclusions, and there are light-colored and tufaceous phases of the andesite. Sometimes even the trained petrographer will be deceived or in doubt till he has the opportunity to use the microscope. The geological survey of the university offers its services in making such determinations, and it is well supplied with the necessary instruments.

If we were to name the mining camps where the country rock of the gold dikes is formed by the old andesite series of eruptives, nearly all the important mining camps would be included. The Mogollons, for example, afford illustrations of central andesite mountains covered and penetrated by later flows of trachyte and other acid eruptives. The same is true of the Black Range and of the Magdalenas. The Cochiti is a beautiful illustration of an isolated group of andesite peaks surrounded by a girdle of trachyte and obsidian eruptives. Here the form of the later eruptive is scoriaceous, and the beds of tufa cover vast areas and no doubt protect many rich lodes from the destroying hand of the miner. In southern Colorado we have traced the applicability of the same law. The Cerrillos group has but a small core of andesite in the midst of later material, but forms, with the series of mountains to the south, a special case.

The Otiz Mountains, for example, is chiefly composed of a remarkable rock of a granitoid appearance, which proves to be a rare species of ægerine syenite, but

intermediate between an acid and basic rock. This extends in vast sheets over the Cerrillos coal fields, and in some cases interpenetrates the coal series, and has been the agent in the transformation of part of the lignite into a fine quality of anthracite. The radiating dikes of the same material form conspicuous landmarks in this region. The mines in the Ortiz are due to quartz intrusions in this material, which plays the same part that andesite does in other cases, and, moreover, it is intimately associated in many places with the true andesite. The southern part of the Cerrillos Mountains is made up largely of the same syenite, which has a decidedly greenish color in typical specimens, but there are also dikes and bosses of andesite immersed in the later flows. The syenite in this case has been intimately blended with fragments or great masses of the sedimentary rocks through which it has broken its way. These rocks were mainly Jura-Triassic and Cretaceous. It would appear from a careful study of the region that the turquoise owes its origin to action of the molten syenite on the copper-bearing sandstone of the Jurassic it had caught up in its escape. In the same way the deep deposits of lead and zinc may be explained as a result of the action of these flows upon the underlying Carboniferous. Other instances of this kind bear out the theory of such interaction.

The San Pedro Mountain is a more complicated instance of the interrelation of the andesite and syenite flows. The central part of the group is an old andesite volcano, but it has been thoroughly transformed by the intrusion of the syenite, so that the two rocks are apparently interbedded over the central parts. To the east the syenite is the prevailing rock, and large sheets and dikes of the same material occur. As in the case of the Cerrillos, the flows have caught up and uplifted the sedimentary sandstones and limestones. A curious garnet rock has thus been formed, and along the contacts of this are large deposits of copper and gold. The andesite and syenite association is also a good one for gold, and the region is a favored one in its geological construction, though somewhat circumscribed and disturbed. The effect of the eruption has made itself felt on the carboniferous limestones and, as in similar situations elsewhere, the contained lead and silver have been segregated by this agency, forming valuable mines.

South Mountain is also a syenite uplift, but the andesite element is lacking, and accordingly there seems to be no separation of gold. The adjacent limestones have, however, produced rich lead silver deposits of rather small and irregular nature.

In the Santa Rita district we have an illustration of the application of another principle. The region is essentially granite, the granite being like that elsewhere in the Territory—of a metamorphic nature. Upon the granite and its superjacent quartzite or conglomerate is a large sheet of limestone of subcarboniferous age. Along the Hannover Creek is a ridgelike uplift, from which the lime dips both ways, revealing the fact that at the contact of the lime with the underlying granitic rocks there is a collection of iron. In this case the iron is of great extent and good quality. In many places the iron has served as a precipitant for copper in the way above described, and large copper deposits occur. In the Santa Rita district proper is a large basin, affording an extraordinary opportunity for such precipitation. The basin is not of recent origin, as is seen by the occurrence of artesian water and the extensive alteration (kaolinization) of the feldspars in the porphyrys and granites of the basin. The iron may have come from the disintegration of the granite. The basin seems to have been formed by an uplift and fault to the south, cutting off the natural outlet. The iron appears on the margins of the basin and doubtless played its part in the collection of the magnificent copper deposits. The country rock is chiefly an orthoclase porphyry. The ores may originally have been in the form of the sulphides, but they now embrace the entire range from native copper in beautiful plates and concretions to malachite and azurite. Melachonite and cuprite are the characteristic ores in many of the openings.

The above instances are cited to illustrate principles which the observant miner may apply for himself. A few of these points may be summarized as follows:

Gold and silver are indigenous to the older eruptives, but require the influence of later silicious rocks to segregate them. They need not be sought in the later trachyte or rhyolite rocks unless there be present andesite or other basic rocks. It is useless to search for ore in the recent basalts. Copper is indigenous in the Juratriassic sedimentary sandstones, and may be found in organic deposits. It may also be found in the contact between the stratified rocks and the underlying granite, but peculiar circumstances alone warrant the hope of discovering large accumulations in either instance. Such a condition is afforded when the granite forms a basin and when iron deposits have preceded the copper. Lead is to be sought in the carboniferous limestones where the latter have been brought within

the segregating influence of dikes of older eruptives. The lead will be found in shoots or channels worn in the limestone or in more permeable zones. The silver values are likely to be greater where the lead has been sublimed by heat. The original form of the lead is as galena, and the occurrence of carbonates indicates a concentration by water action. Turquoise is a result of metamorphism of copper-bearing stratified rocks by the action of intrusive igneous rocks.

These aphorisms might be largely extended, but may serve to indicate the tendency of recent research and the scope of the work now under way.

Very respectfully submitted.

C. L. HERRICK.

Hon. MIGUEL A. OTERO,
Governor of New Mexico.

NEW MEXICO MINERALS.

GOLD, SILVER, COPPER, LEAD, AND IRON.

RICH FIELD FOR PROSPECTOR AND INVESTOR IN EVERY COUNTY IN THE TERRITORY—THE CLIMATE PERMITS OPERATIONS THE YEAR ROUND.

That the whole mountain region of New Mexico presents a sure prospecting field is a safe assertion. To say that a few favored spots at which developments have taken place—merely points on the vast area of known mineralized territory—show even a small part of the great resources of our mountains is false. In the heart of the best developed camps is still much virgin ground, and much of the mineral-bearing area has scarcely been scratched by the prospector's pick. The chances in this Territory to-day are equal to those presented by the Cripple Creek or Leadville districts.

New Mexico has upwards of 80 mining districts, which are widely distributed, proving that the mineral wealth is not confined to one section.

In the northwest San Juan County presents great possibilities for extensive hydraulic operations.

Next, to the east, is Rio Arriba, where many thousand acres carry placer gold in sufficient quantities to permit of large enterprises. Perhaps no stream in the west presents the same advantages for the successful employment of first-class placer dredging machinery as the Chama. This gravel runs by test from 35 cents to $3, and, in some cases, as high as $7 per cubic yard. The famous mica beds are also in Rio Arriba County.

Taos County is not only a rich field for the placer miner, but for quartz mining it has districts already developed which indicate its boundless wealth. The Red River country is already well known to the mining world and is rapidly making a reputation as a producer of gold. La Belle and Amizette are also vigorously pushing to the front, development showing great possibilities.

Colfax County has already produced many millions in gold. Comprised within the boundaries of the Maxwell grant in this county are a large proportion of mineral lands, and the liberal terms given to prospectors by the grant owners is worthy of notice. Among the districts on this grant are Old Baldy, a large producer of gold; Ute Creek, where is located the famous Aztec mine, with a record of almost $1,000,000, and the Montezuma, a producer of about $300,000. There is great activity in Moreno Valley and in the Elizabethtown placers, which have to their credit over $200,000 in gold. Hematite is another promising camp in the immediate vicinity.

One of the richest mineral regions of the world is to be found in southern Santa Fe County. The placers at Dolores, Golden, and San Pedro, which were worked more than two hundred years ago by the

Spaniards, and are still being worked with "dry washers" by their descendants, have an inexhaustible supply of paying gravel, and the mountain range is one vast upheavel of mineralized rock. Cunningham Hill, in this district, is famous as being a mountain of ore. Dolores, San Pedro, and Golden were all mining camps before the discovery of Pike's Peak. At Dolores the Ortiz mine was a producer for years, the first milling machinery for the mine having been freighted across the plains before the advent of the railroad. It has a record of several millions, and preparations are under way to make the mine an extensive producer again. Near the Ortiz mine is the Benton, also a heavy producer of gold in former times, but idle for several years owing to litigation. The Benton is now in the hands of Judge Foree, of Durango. Near San Pedro the most noted properties are the Lincoln Lucky, the Gold Standard, and the Santa Fe Copper Company's mines. The Gold Standard has recently been bonded to capitalists for ninety days at a comfortable figure. At Golden is also located the Monte Cristo Mining Company, which is successfully working the immense gravel deposits on a large scale. Near Cerrillos is situated the turquoise mine. The output of turquoise since 1890, according to official report, has been about $2,000,000, although the former owner of the property claims this to be an underestimate, and says the yearly output since 1893 will reach $1,500,000.

Bernalillo County has 5,000 square miles of mineralized lands. The Cochiti district, in the Jemez Mountains, is becoming almost as well known as the farfamed Cripple Creek, and is willing to dispute with the latter the title of the "greatest camp on earth." The Albemarle has one of the finest milling plants in the West, and the returns from the company's mines are a substantial proof of what energy and capital will accomplish in New Mexico. Others of the best-known properties in the district are the Washington, Lone Star, Crown Point, Iron King, and many more. Hell Canyon, 20 miles to the east of Albuquerque, has some large bodies of free milling ore and fine indications of copper. Considerable work is now being done in the district and the near future will see it attracting the attention it deserves.

The Magdalena Mountains, in Socorro County, have been for years the scene of great mining activity. Lead-silver ores abound in the district, and late developments at Water Canyon and Copper Creek show good bodies of gold ore. The Graphic mines, under the management of Capt. A. B. Fitch, are well-known producers, and are at present being worked to full capacity day and night. The Kelly mines are also located in these mountains. In western Socorro County, near the Arizona line, is the Cooney district, rich in high-grade silver ores, but now being worked for their values in gold.

The far-famed Black Range of mountains, extending through Sierra County in a northerly and southerly direction, form the Continental Divide and constitute one of the greatest mineral sections of the world. From San Agustin plains on the north to Cook's Peak on the south, about 120 miles, and with a breadth of 40 miles, is a vast mineralized area which has been producing gold, silver, copper, and other precious and useful metals for years. The established districts on the north most largely developed are the Black Range and Apache, whose possibilities are as yet practically untouched and are beyond estimate. Following the range south are the Animas, Lake Valley, Percha, and Kingston districts, the principal mining centers on the belt above spoken of in Sierra County. At all these points are highly productive gold and silver mines. The ore from the Silver Cell, one of the

deservedly famous mines in this range, was so rich that it was refused by the smelters and had to be sent directly to the mint as bullion, and the "Bridal Chamber," in the same range, took out in one piece silver valued at $80,000. One chamber, with the dimensions of an average dining room, surrendered to its lucky owners more than $1,000,000. Is it not time for capital to more thoroughly investigate a country with such stores of wealth? The immense gravel beds, rich in gold, at Hillsboro, should also be mentioned.

Grant County has within its boundaries some of the best-known gold-producing camps of the Southwest. Santa Rita del Cobre, the oldest district, has been worked since 1808, and its mines are rich in copper. Pinos Altos has a number of large producers, and the results accomplished in the past two years are proof of what capital and judgment are capable. San Francisco and New York mining men are large holders of Pinos Altos properties, and their presence in the district is felt. Hanover is rich in copper, and developments at present make special reference to the camp or individual mines unnecessary. Its ores are rich in copper, with an excess of iron. Cook's Peak is a heavy producer of lead-silver ores, and the shipping records of its many producing mines are its recommendation. Other camps in Grant County which are attracting their share of attention are Central, Gold Hill, White Signal, and Black Hawk, all rich in gold, silver, copper, etc.

Donna Ana County is dotted and crossed with mountain ranges which are pregnant with mineral wealth. Mines in the Caballo Mountains carry lead-silver ores; those of the Organs are rich in native silver, and in the San Diegos is found free-milling gold ore. There have been several recent strikes in Donna Ana County which are very rich.

The Old Abe mine, near White Oaks, in Lincoln County, is one of the heaviest gold producers of the Southwest. Workings in this district have reached a depth in some mines of 800 and 1,000 feet, and at that depth ore bodies are more permanent than nearer the surface, showing that nothing is lost by deep working. The Bonito country has extensive low-grade free-milling gold ores, but has been little prospected. In fact, this entire section is almost a virgin field for the prospector. The Jicarilla placer fields are well known to the miner looking for a grub stake. The completion of the El Paso and Northeastern into this rich section will go far toward assuring its future.

In the new county of Otero can be found minerals which will bring it prominently to the attention of the mining world. Besides the new placer discoveries in the Jarillas, which cover about 40 miles of gulches, a new find of ore, believed by the lucky discoverers to be tin, is the latest, and as there are large bodies of it, if their surmise proves to be correct, it will become one of the centers of mining excitement in the Territory.

The chain of mineral deposits running through Colorado are practically the same as found throughout the entire extent of New Mexico, superficial conditions and geological formations in this Territory being almost identical with those found in Cripple Creek and other rich Colorado camps. Following the mountain range from the northern boundary through Colfax and Taos counties to the southeast through Santa Fe to Lincoln, and to the southwest through Bernalillo, Socorro, Sierra, and Grant counties, the same general indications are met, the outcroppings being conspicuous and almost continuous. Many mines in this range have been good producers for years and new and valu-

able finds are of almost daily occurrence. At the present time development is being carried on more vigorously than in the history of the Territory. When the prospector and investor considers that this mineralized region extends through New Mexico a distance of over 400 miles and strikes almost every county in the Territory, he can readily see that it is the most attractive field in the West. Climatic conditions which make it possible to work the year round are also an advantage not to be overlooked.

Pine, fir, and spruce cover the mountain ranges below timber line, thus furnishing a plentiful supply of timber for mining purposes.

In the matter of fuel the coal fields of New Mexico are extensive, and as they are widely distributed, their product is easily and cheaply furnished to every district in the Territory. Labor is another feature which must not be overlooked, as it is especially cheap.

Among the natural resources of the Territory are gold, silver, lead, zinc, copper, brown and red hematite, ricolite, mica, coal, limestone, sandstone, fire clay, hydraulic cement, infusorial earth, silicified wood, turquoise, garnet, opal, natural gas, petroleum, mineral waters, mineral paint, alum rock, basalt, and the latest discovery—tin.

MINING AND MINERAL RESOURCES.

The mining resources of New Mexico are something wonderful. Here we have practically everything in the shape of mineral too numerous to mention, but running from salt and sulphur up to gold and silver and precious stones. And while there are numerous paying mines, none of them are what may be said to be well developed so far. All that it needs is the influx of more capital to thoroughly develop its various mines, when this Territory will become one of the richest mineral-producing regions of the Rocky Mountain range.

The mineral resources of our Territory have been slowly but surely forcing the attention of capitalists, and the outlook for the coming year is very encouraging and brighter than it has ever been. It has been a hard matter to interest men of means in our mines, but gradually this indifference is wearing off and capitalists are now sending experts to examine into the many promising propositions throughout the Territory, and we hope for good results from the interest taken by our Eastern friends, as New Mexico offers as fine opportunities in the mining line as any portion of the globe. This interesting of capitalists means that money for development, for mining machinery, for smelters, mills, and other reduction plants will find its way to New Mexico and make the mining camps of New Mexico large producers.

GOLD OUTPUT WILL BE ENORMOUS FROM MANY DISTRICTS—EASTERN CAPITAL IS BEGINNING TO DISCOVER THE OPPORTUNITY—NOT ONLY GOLD, BUT OTHER METALS AND PRECIOUS STONES ARE FOUND THERE.

Mining matters in New Mexico can only be spoken of as surprising in every respect, and everywhere from along the line of that industry reports are continually coming in of new strikes being made, old mines being worked to their fullest capacity, and new corporations being formed for the purpose of exploration and practical working. It is being demonstrated every day, and in all of the principal districts, that there is gold and plenty of it. What is needed now is capital with which to work mines that have been proved more than good paying propositions. In many districts the experimental period is positively passed, and practical work with capital is being done. Capital is pouring in from the East, and the gold mines of New Mexico are proving vastly more productive of profits than the manufactories of Massachusetts, Ohio, and Illinois, and Eastern men are beginning to realize that such is a fact.

THE MOGOLLON DISTRICT.

Down in the southern or Mogollon district the activity is very great, and increased capacity is steadily marked. The Confidence is turning out from 80 to 100 tons of ore every day with a force of 70 miners. The ore is of good quality, and the proprietors are enjoying a well-deserved period of profits.

The Deadwood mine, in the same district, is now run in connection with the Deep Down mill, which is using daily considerable ore which averages $16 in gold and $21 in silver. There are immense bodies of this ore in sight and very easily gotten out. Numbers of smaller mines in the same district are being worked, and prospectors are actively looking up that region, and with considerable success. The Philadelphia men who are interested in that section are reported as pushing the formation of their big company, and it is expected their operations will be commenced in the near future, giving numbers of men in that region employment.

THE HILLSBORO OUTPUT.

And at Hillsboro, in practically the same district, the output from the mines last week amounted to 180 tons. This is a section which could be advantageously prospected. Other regions in the Territory have become so well known to mining men that their attention has been diverted to a great extent away from the promising Hillsboro country, although it has been demonstrated there is plenty of gold and other mineral in that region only awaiting development.

In the Ortiz mine grant things are looking lively. The men who have control of the Edison interest there do not say much, but it is generally known that the machinery for the intended gigantic operations on that grant by the Edison Company is being gotten ready in the East as fast as possible, and that before very long a large number of men will be finding employment in producing the yellow stuff from that immense deposit of ore.

THE ORTIZ MINE.

The Ortiz mine is now being run to its full capacity, about 50 tons per day being the average. This mine bids fair to become a wealth producer, and it is significant that but a few months ago the boiler horse power at that mine was but seven. Within a few months two changes, both for more power, have been instituted, and to-day they are using a 100-horsepower boiler, to its full capacity, with the probability in the near future of being compelled to add more as their property reaches a higher state of development.

The Shoshone, in the same country, is another proposition which is very well thought of, and the owners are now engaged in sinking another shaft. At a depth of 20 feet, 4 feet of mineral has been disclosed, and predictions for the future of that property are very bright.

THE COCHITI DISTRICT.

In the Cochiti district and around Bland and Golden things are particularly promising. Bland seems to be a trifle more favored so far as new people and prospectors are concerned, it being reported that new arrivals to that camp have averaged 10 per day for some time back. As few of the new prospectors seem to have any thought of leaving, it must be taken as conclusive evidence that the camp is in a sound, healthy condition. Most of the new arrivals are those directly concerned in mining, and as there is a large unexplored and unclaimed body of land in that vicinity yet, the prospects seem to be alluring for the prospector. Newly-opened claims are very easily disposed of, but the owners seem to be inclined to hold on, knowing that time will increase the value of their properties. The Cochiti is undoubtedly the best paying region in the Territory.

NOT A BOOM MOVEMENT.

The unusual developments, both under way and projected, are not the result of a boom; they are but the honest, gigantic stride forward of a surpassingly rich country, whose resources are beginning to be known. The latest big project is the substitution of electricity for steam as the motive power in that district. With a big dam constructed across the Rio Grande about 12 miles above the Albemarle group of mines, and an electric-power house at that point large and powerful enough to furnish power to not only the mills, but for the tramways and lighting purposes, it is plain to be seen that the Cochitis will be prosperous. This scheme is a bona fide proposition and will be carried out by the manager of the Albemarle, backed by his company. One mining deal was consummated this week whereby a Mr. Weatherhead, of Cleveland, Ohio,

gained control of the Gleason mine at Golden. He proposes to immediately install new reduction and smelting works on his claim and the property will no doubt pay out big. It has a 2½-foot vein ranging from $20 to $200 to the ton.

In the Crown Point active work is being done, drifts being run, and the contractors report the ore improving at every foot of advance. The Monte Cristo has been enjoying a run of luck, and the owners have ordered 100 tons of machinery for their placer claims. On the Ermine extension development has been recently done, the results proving highly satisfactory, the property showing a 4-foot vein running through. On the Albermarle Group everything is humming. The pay roll of this mine already averages $16,000 per month, and that property bids fair to make a national reputation as a producer of gold. While gold commands the most attention, the silver propositions are all right, and should silver ever be restored to its rightful place, prodigious production of that metal in central New Mexico would be chronicled. Opals are frequently found in this part also. In Santa Fe and more particularly Taos County, deposits of copper are being exploited with good results, and the Copper Glance mine in Taos County has been bonded to Chicago capitalists.

THE RED RIVER COUNTRY.

Up in the Elizabethtown and Red River country everything betokens a very busy summer, and, like the other mining districts of the Territory, seems to be very sanguine of pronounced and abundant success.

Every able-bodied man in that region is able to instantly command work. At the Mallette property very fine free gold specimens have been shown up, with the full expectation that the good prospects will continue. The "I Own" is undergoing considerable development. H. B. Tompkins's property on the Black Mountain, in the same vicinity, is panning out well, his shaft at 35 feet showing up a 4-foot vein of excellent ore. One of the promising claims is that of Henry Young, who has been actively at work taking out ore that assayed $500 per ton. The Anderson property at Elizabethtown is authoritatively reported as sending $100 ore to the mills. In the northern region, and, in fact in the several mining districts of the Territory, the mining outlook for the coming season is particularly enticing, and there is no doubt but the present success will prove a great benefit as a sound advertising medium for the undoubtedly great and rich mining resources within our borders.

THE MINES OF NEW MEXICO.

[From Territorial Bureau of Immigration]

GOLD, SILVER, COPPER, LEAD, IRON, COAL, AND ALL THE PRECIOUS AND USEFUL METALS AND MINERALS—FIELDS FOR THE PROSPECTOR AND INVESTOR IN EVERY COUNTY OF THE TERRITORY—A CLIMATE THAT AFFORDS AN OPPORTUNITY FOR THE MINER TO WORK THE YEAR 'ROUND—THE ATTENTION OF MINING MEN FROM THE NORTHERN STATES NOW BEING ATTRACTED TO THIS TERRITORY, RICH IN MINERAL, AND LARGE-SIZED INVESTMENTS ARE BEING MADE.

A vast mineral field.—Mr. J. D. Bone, a mining expert of good standing, who has a practical knowledge of the different mineral districts in the Territory, says:

"As a broad assertion, we may say the whole mountain region in New Mexico is a fair and a reasonably sure prospecting field. It is a very false idea to suppose that a few favored spots, at which development has taken place—merely little pin points on the vast area of known mineralized territory—are all, or one-thousandth part, of the great resources of our mountains.

"We do not hesitate to say that quite a promising field for prospecting would be right in the midst of any one of our oldest camps. This being true in the oldest and most mining camps of the Territory, surely the vast field of known mineral bearing area has been but indifferently prospected, if indeed, at all.

"The seeker after hidden wealth has here in New Mexico a wide field, one which it is not at all improbable will exceed in value anything yet discovered. The areas most likely to produce results are where eruptive forces have been most active and the disturbances and crystallizing of the strata most pronounced.

"In this Territory, with its 122,444 square miles, are rich and inviting fields, practically untouched by the pick of the prospector, and offering the miner and capitalist opportunities for rich returns for labor and money expended, such as are very seldom found in any mining section of the great west. As good, if not better, chances are presented within the boundaries of this Territory than were found in Leadville or Cripple Creek, Colo.

"*Mining districts.*—This Territory has now some eighty five mining districts, which are scattered widely, and cover a large section of country, thus showing

that the mineral wealth is by no means confined in any one special place, but largely distributed over a great extent of territory.

"The territory in New Mexico already more or less developed equals 30,000 square miles of mineral-bearing country, and the better developed districts of this vast extent are as rich as any exploited elsewhere in the United States, and its as yet great 'undeveloped areas' offer to the intelligent prospector and energetic man of means opportunities found in no other mining country.

"*The great mineral belt.*—By examining any ordinary map of the Western States it will be seen that all of the most valuable recent developments of minerals in southern Colorado are on a well-defined line following the Rocky Mountain system into and across New Mexico, and that that line extends through the central west and southwest portions of the Territory without a break of any considerable extent.

"That conditions along this extent of country, almost 400 miles in length, in many respects resemble the gold and silver bearing formations of Creede, Cripple Creek, Rosita, Silver Cliff, and the great San Juan country of Colorado can not be doubted, and in the coming years it is not unlikely this section of New Mexico may develop many places as productive of wealth as the above-named Colorado districts.

"*New Mexico gold fields.*—Lying just south of the great Commonwealth of Colorado, our first counties are San Juan, Rio Arriba, Taos, Colfax, and Union.

"The evidences of gold throughout San Juan are such that this county becomes attractive as a point where extensive hydraulic operations may be conducted with every assurance of success.

"Passing east from this county we come to Rio Arriba, where the mineral deposits, worked to any great extent, generally take the form of placers and vast fields of coal. It would seem to us that in the vicinity of Tierra Amarilla and Good Hope would be a good and most promising prospecting field for the precious metals.

"*Rich placers.*—Near Abiquiu, along the Chama River, are gold placers that cover nearly 20,000 acres, which show a remarkable average yield of gold, and as water seems to be plentiful for most of the year, this vicinity is unexcelled as a point where large and paying mining enterprises may be conducted. Examination of these deposits along the Chama River are now being made by Prof. F. A. Reynolds, acting under directions from an Eastern mining syndicate, and the daily press report this gentleman as saying that gravel tested by him runs from 50 cents to $3 in gold per cubic yard.

"The deep placer deposits of Taos County, along the Rio Grande, are probably the most extensive in the United States, and investigation warrants us in saying that nothing since the discovery of California and Australia is comparable for its measurable resources of gold available by the hydraulic process. Reference to the report of Prof. Benjamin Silliman, of Yale College, to the Commissioner of the General Land Office, published in 1880, will fully convince even those who are sending men and money to explore Alaska's frozen fields that right here in New Mexico—a land of perpetual sunshine—are equally rich and much more desirable gold-placer deposits. The altitude of these deep placer deposits is perhaps 7,000 feet; still, because of this locality being sheltered by the encircling mountains, and because of its more southern latitude, placer mining can be carried on quite nine months of each year and at points the entire year. These great placer deposits do not alone constitute Taos County's great undeveloped resources, for her mountains are rich in metals, as is fully shown at numerous points where there are producing gold, silver, and copper mines.

"*Quartz mining.*—The Red River country in Taos County is fast becoming known to mining men throughout the world as a district destined in a very short time to rival any one of our greatest gold-producing sections.

"At La Belle, Amizette, and other points development is being rapidly pushed, and it may be said that Taos County has fairly entered upon a bright mining future.

"To the east of this rich county of Taos lies Colfax County, a district which has produced many millions in gold, and which to-day gives brighter promise than at any time in its history. A very large proportion of the rich mineral lands of this county are comprised within the boundaries of the Maxwell Land Grant Company's property. The liberal policy pursued by this company in its dealings with the prospector is worthy of notice. The management of this grant has laid down rules very similar to those governing mineral locations on public domains, and the property is thrown open to the prospector and miner, who can at a nominal cost acquire title and develop mining properties on the grant. The old Baldy district on this grant is a large gold producer, so also is the Ute Creek district, where is located the famous old Aztec mine, with a record of almost a million in gold. The

Montezuma mine, on what is commonly known as Montezuma Hill, has produced between $200,000 and $300,000.

"There is greater activity in the west Moreno Valley district than ever before, and only 8 miles from the new but promising camp of Hematite are the world-famed Elizabethtown placers, which have produced over $200,000 in gold. Aside from these famous placers it is said that miners, in a crude way, produce large sums in gold from placer ground but little known.

"*Grand opening for prospectors.*—Little mining of the precious metals has been done in Union County, but it is not an unlikely field for prospecting for our undeveloped mineral resources.

"Passing from Union County, we next take up Mora and San Miguel counties, two sections of the Territory which seem to have been but indifferently prospected. The mountain range west of the city of Las Vegas lies directly in the gold-producing belt, and surface indications are most favorable.

"South from the city of Santa Fe, Santa Fe County, and not far from the town of Cerrillos, in a disconnected range of mountains, with perhaps an average width of 7 miles, is one of the most remarkable mineral regions of New Mexico, and we may say of the world. This range travels north and south and is known as the Ortiz Mountains. The surface indications are unsurpassed, and a number of fine bodies of low-grade, free-milling gold ores are found, among which may be especially mentioned the famous Cunningham Hill and adjoining properties near Dolores. The main western lode, especially in its southern extension, is rich in copper, as found in the workings of the San Pedro Copper Company. This region was known to the early Spanish explorers, who, upon their advent into this country, discovered and worked the rich gravel deposits at the base of Ortiz Mountain, in and about San Pedro, Golden, and Dolores.

"*A million a year.*—An experienced and reliable expert who examined these extensive placers a few years ago reported that, 'if sufficient water were placed thereon, these placers could be made to yield $1,000,000 in gold per year for over twenty-three years.' The 'country rock,' being soft and porous so that the vein matter lying near the surface rapidly oxidizes and the oxidized 'honeycomb' quartz remaining with its vast supply of free gold, is eroded by degrees and being carried down the slope to feed the placers below.

"*The famous turquois mine.*—In the vicinity of Cerrillos is a small section of mountainous country, in which is located one of the world's best known and most productive turquois mines. There are, as near as we can learn, some sixty or seventy turquois claims in New Mexico, some ten or a dozen in active and profitable operation.

"The output of turquois in New Mexico, as taken from official sources, was $150,000 in 1891, $175,000 in 1892, $200,000 in 1893, $250,000 in 1894, $350,000 in 1895, and $475,000 in 1896; but it is openly asserted that the true value of turquois mined since 1890 has been greatly underestimated. As an illustration, one of these mines sold in 1893 for $250,000, and, according to the statements of a former owner, has paid a million and a half a year since that time. One single stone taken out is reported to have been bought for $6,000 in New York.

"*Cochiti and Hell Canyon.*—Leaving Santa Fe County, we next take up Bernalillo, which has an area of 8,000 square miles, of which 5,000 square miles are classed as mineral lands. The well-known Cochiti mining district practically dates from discoveries made in 1893. Progress was retarded by title suits under old grants, but a decision favorable to the miners was recently handed down by the United States Supreme Court, and now development in this wonderful camp goes steadily forward.

"East of the city of Albuquerque some 20 miles is the Hell Canyon district, destined in the near future to attract widespread attention. The large bodies of free-milling ores disclosed in the workings of the mines are probably as extensive for amount and character and work as any in the United States. These large bodies of ores are deserving of investigation, and if operated on proper lines will produce handsome returns for many years to come. Considerable mining machinery is now being placed in the camps and active operations will soon commence.

"In our travels south we have now come to Socorro, a county blessed with abundant natural resources, extending as it does about 170 miles east and west by 100 miles north and south, and containing over 10,000,000 acres, some sections of which have produced millions in mineral wealth. This county, which for many years past has been steadily adding to the mineral wealth of the world, stands to-day upon the threshold of a brighter future than at any time in its history.

"*A carload of bullion a day.*—Just west of Socorro City there are large deposits of lead-silver ores, but only at one point in the county is this class of ores now

being mined to any great extent—in the Magdalena Mountains. Water Canyon and Copper Creek districts, west of Socorro City, are very rapidly coming into prominence as gold producers, and with the improvements now being made bid fair to rival the best-known sections of the Territory. At the town of Kelley, some 30 miles west of the city of Socorro, are located the famous Kelley mines, heavy producers of lead-silver ores. Under the able management of Capt. A. B. Fitch the Graphic mines are producing with ease sufficient ore to keep in full operation day and night the 100-ton smelter. A carload of bullion is turned out by this plant every twenty-four hours, thus making lively times not only for the many miners in and about Kelley, but every man in this section reaps a measure of benefit from this industry.

"Away to the west in Socorro County, near where the Territorial boundary line joins Arizona, is located the Cooney district, a section at one time producing high-grade silver ores, but whose mines are now being worked largely for the gold values contained in the ores.

"*The far-famed Black range.*—We have now reached the county of Sierra, wherein are located the well-known Mimbres, or Black range of mountains, which in many respects are among the most remarkable in the United States. It has been most truly said that an extent of country from San Augustine plains on the north to Cooks Peak on the south, a distance of over 120 miles, is mineralized in a greater or less degree throughout. Mines located along this mineralized belt of country have long been famed as steady producers of high-class ores of all the useful metals, including gold, silver, copper, lead, and iron. The Black range extends in a northerly and southerly direction, and is about 40 miles in width. The apex or summit of the range forms what is known as the Continental Divide. The topography of the country is such as to make any point easily accessible."

A yet undeveloped field.—A large percentage of the known mineral-bearing area of New Mexico has been but indifferently prospected—very much of it not at all. Consequently there is still here a wide field for the seeker after hidden wealth. It is therefore not impossible, or even improbable, that there are yet here quite as profitable fields, untouched by the pick of the prospector, as any that have been developed. There is good reason to believe that the southerly western portions, nearly all mountainous, bordering Arizona and Old Mexico, abound in all the valuable minerals equally if not beyond the northeasterly portions of the mountain areas, nor that in due time, under the rigorous search of the energetic and intelligent prospector, great values will in the not distant future be developed, and to an extent and value equal, if not beyond, any that have yet been reached.

The capitalist, the miner, or prospector who decides to cast his lot here will find the foundations of a broad and enlightened society well established. They will find a generous, progressive, and liberal-minded people, ready to lend a helping hand to every comer. They will find order, society, law, and an enlightened public sentiment ruling the Territory.

Favorable climatic conditions.—Not only the character of these deposits as given by conservative and reliable correspondents, but the accessibility and value as shown by the daily record of output and the vast extent of the field covered, mark this as the most attractive field covered to the minor and mine hunter yet developed on the American continent, if not in the world.

The annual report of the New Mexico section of the United States Weather Bureau for 1897, published in Bulletin No. 1, 1898, contains valuable information in regard to the climatic conditions in New Mexico, especially to prospectors and miners. While it shows, as compared to more northerly latitudes, that the mean temperature of the mining sections of New Mexico was seldom below the freezing point and the weather was very rarely too cold for prospecting or surface-mining work. If so disposed, the miner can put in the entire year prospecting or mining, at his pleasure or convenience.

Mining claims, how located.—The bureau frequently receives inquiries asking for information concerning the manner of locating mineral claims in New Mexico, and if our laws differ from the regulations prescribed by the United States General Land Office.

We can say that, in the main, the United States laws, as found in the Revised Statutes, governing the location of claims, govern also in New Mexico; the laws of New Mexico making one additional requirement relating to the locating of mines, which is set out in section 1 of chapter 25, Laws of 1889, as follows:

"That the locator or locators of any mining claim, located after this act shall take effect, shall, within ninety days from the date of taking possession of the same, sink a discovery shaft upon such claim to a depth of at least 10 feet from the lowest part of the rim of such shaft at the surface exposing mineral in place, or shall drive a tunnel, adit, or open cut upon such claim to at least 10 feet below the surface exposing mineral in place."

The United States laws prescribe that mining claims upon veins or loads of quartz or other rock in place, bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits, shall not exceed 1,500 feet in length along the vein or lode; and the claim is limited to 300 feet on each side of the vein or load. (See sec. 2320, Rev. Stats.)

Tunnels.—Where a tunnel is run for the development of a vein or lode, or for the discovery of mines, the owners of such tunnel shall have the right of possession of all veins or lodes within 3,000 feet from the face of such tunnel on the line thereof to the same extent as discovered from the surface; and locations on the line of such tunnel, of veins or lodes not appearing on the surface, made by other parties after the commencement of the tunnel, and while the same is being prosecuted with reasonable diligence, shall be invalid. Failure to prosecute the work on the tunnel for six months shall be considered an abandonment. (See sec. 2323, Rev. Stats.)

Remarkable activity.—The eyes of mining men being now upon the remarkable activity which has suddenly opened up in the Cochiti district, we quote what Mr. Frank W. Wynkoop says of one of our live camps:

"A movement of great importance to the mining world, and especially to New Mexico, is at present in progress in the Cochiti mining district, which is situated in Bernalillo County, some 50 miles north of Albuquerque, the county seat, and some 40 miles west of Santa Fe, the capital of New Mexico. Mining is reviving throughout the district. Mining companies of long and general experience, supported by unlimited capital, have taken hold of many of the larger properties, and have instituted operations of a nature not to be surpassed by those of any mining district in the West. The leading features of these operations consist of the construction of a steel mill of 125 tons daily capacity, at a cost of $250,000, to treat the ores of the Albemarle group of four mines; the resumption of operations at the Bland mill, under improved methods and with excellent success in the saving of the gold and silver values contained in the ores of the Lone Star group of mines, at a cost sufficiently low to afford a handsome profit; the projected new 200-ton mill to treat Crown Point and Pino Canyon custom ores, and the development of many of the mining properties which, up to a few months ago, lay idle for the need of capital to make them paying mines.

"To give an idea of the magnitude operations in this district are attaining, we will mention the fact that within the past three months extensive developments have been in progress upon four large properties; five other large groups of claims have been taken under lease and bond by responsible mining companies of long experience for large amounts; the construction of one quartz mill has been completed and the construction of another mill is in progress, while two others are in contemplation of early erection.

"The entire Cochiti mining district embraces a mineral region some 6 miles from east to west by about 18 miles from north to south, and includes three distinct parallel quartz lodes extending north and south and cropping above the surface, which are of enormous size and possess an even value of $8 to $40 to the ton, selected ore running as high as $1,800 to the ton.

"The indications of the present leave little doubt that the Cochiti mining district will henceforth enjoy an era of great prosperity."

A Klondike at home.—The "Klondike of the Southwest" is the name frequently applied to New Mexico, and, judging from the flattering progress she has made in mining since January 1, 1898, before the end of the year the fever for the gold in the "Klondike of the Southwest" will be as high and unabating as it now is for the "Klondike of the Northwest," and, in contrast and comparison, producing gold against gold, railroad facilities against reindeers and dogs, food against famine, comfort and health against hardships, and happiness against misery.

Our vast natural resources.—It is no exaggeration to affirm that in point of natural resources none of the Rocky Mountain States exceed New Mexico. In addition to gold, silver, copper, lead, and zinc, coal (anthracite and bituminous), fire clay, alum, sulphur, salt, gypsum, onyx, and marble are found in large deposits. New Mexico supplies the world with turquois.

GYPSUM.

In south Santa Fe County, in the county of San Miguel, and in several other places in New Mexico are to be found large deposits of this mineral. In Donna Ana County, on the San Augustin Plains, there exists the largest deposit of gypsum known in the world, of an exceedingly pure character. The location of this deposit is unique. The

San Augustin Plain is about 150 miles in length from north to south, and from 30 to 60 miles from east to west. Near Whiteoaks, in Lincoln County, in the midst of this plain, is the crater of an ancient volcano, the lava from which has flown in a southerly direction like a stream of water for a distance of 60 or 70 miles, varying in width from one-half to 3 miles. At the southern end of this stream of lava there is a small stream of salt water flowing into a salt lake, about 1 mile in width, and 1½ miles in length. At the southern end of this lake the bed of gypsum begins, and extends in a southerly direction down the center of the plain, adjoining what appears to be an ancient river bed, almost without a break for a distance of 50 miles. The gypsum bed varies from 5 to 20 miles in width. It is granulated in character, white as the driven snow, and seems to be piled up on the plain like snow-drifts, requiring no labor for mining or for handling. I can not more accurately describe its appearance than by comparing it to granulated sugar. If you should take granulated sugar in one hand and the gypsum in the other, it would be difficult to tell one from the other by sight or touch. The body of the gypsum stands from 10 to 40 feet above the surrounding plain, and the line is as distinctly marked as the sand upon the ocean beach.

CARBONATE AND SULPHATE OF SODA.

Immediately adjoining this extensive deposit of gypsum upon the west, and in what is apparently the bed of an ancient river or lake, exists a deposit of carbonate and sulphate of soda, carrying about 15 per cent of carbonate of soda, 20 per cent of sulphate of soda, 4 per cent of borax, the remainder being mostly moisture and sulphate of lime. This deposit is about 1 mile wide and 5 miles in length. Its depth is unknown. At from 2 to 4 feet below the surface water is encountered, which is largely impregnated with these minerals and with chloride of sodium. Explorations have been made in several places throughout the deposits by driving down tubes to a depth of from 20 to 30 feet without discovering any change in the character of the deposit.

There is also a considerable deposit of carbonate of soda near Manzano, in the county of Valencia, and near Wagon Mound, in the county of Mora.

KAOLIN AND FIRE CLAYS.

These valuable minerals have been found in considerable quantities in several places in the Territory. The most notable deposit of fire clay worked to any considerable extent is situated near Socorro, in Socorro County. There has been a recent discovery of a large deposit of kaolin and fire clays in the suburbs of Santa Fe of superior quality. Efforts are now being made to utilize these clays at the Territorial prison. In the immediate vicinity there is also found a considerable bed of graphite, and it is hoped that in the near future it will be extensively worked.

ALUM.

A large deposit of alum has been opened on the Gila River. It is reported to be of great commercial value, and is now being worked to some extent. With proper railroad facilities these alum beds and the beds of gypsum and soda heretofore referred to would become the most productive properties in the Territory.

PRECIOUS STONES.

In describing the mineral resources of New Mexico, the native precious stones are worthy of mention, as they are steadily rising in popular estimation and production.

Traditionally this Territory has been noted as having produced some remarkable gems, and recent developments are proving the older records to have been correct. It is only recently that scientific research and skilled labor have been directed to this purpose. The result is a steady increase of expert prospecting and labor in development, which, though only fairly begun, has resulted in finding many varieties of precious and semiprecious stones.

The estimated production and value of gems up to the year 1890 can be found in the census reports of that year. It is worthy of remark that the amount and the value thereof are understated, the facilities for correct and full information being limited.

Since that time the annual product has more than doubled, and is still increasing. Diligent prospecting has revealed new deposits, and the industry bids fair at present to become a large item in the economic resources of the Territory.

The gems found in New Mexico, in the order of their value, are emeralds, there being one now cut in Santa Fe which weighs 1 karat and is of fine quality. Many other smaller ones have been found, although no expert search has been made for them thus far. A very recent find, next in value, is a gem resembling the ruby in respect of color, brilliancy, and hardness. Of these, quantities are found frequently associated with peridots and garnets, but differing from the latter in being harder and of a different specific gravity and form of crystallization. The range of color is from a light rose or pink to that of a bright red garnet. Though no very large ones have been found, yet gems cut from those found have sold at $20 to $50 each, while their numbers and merits have made them a decided acquisition to the list of precious stones of New Mexico, which must, when more widely known, create for them a large demand.

The turquoise deposits of the Territory are too well known to require an extended description. It is only necessary to state that while some of these gems have been famed in Europe for centuries, yet in the United States they have never met the appreciation their merits and rank as gems deserve until the last few years; now they are in great demand, having been pronounced by experts equal, if not superior, to the Persian turquoise. There are single gems from Santa Fe County, now in New York, held as high as $4,000, and some in Santa Fe of nearly equal size and quality.

This sudden appreciation has given a stimulus to further research, resulting in finding large turquoise deposits near Silver City, in the Hatchitas and Cow Spring mountains, of great merit. One of the new discoveries is phenomenally large, considering quantity of production, size, and color of stones found in it.

In addition to the above-named are found native euclase, the so-called Montana sapphires, garnets, milk and fire opals, peridots, a great variety of fine agates, besides petrified woods, fit for inlaying, mosaic work, or jewelry. Gold and silver quartz, valuable for fine work in jewelry, are produced from various mines.

COAL.

Chief among them is that of coal, of which there are large beds of bituminous situated in nearly every county in the Territory, and an extensive body of anthracite coal near Cerrillos, in southern Santa Fe County.

WEALTH IN SULPHUR.

BEDS CLOSE TO A PECOS VALLEY STATION.

The following article on the sulphur beds lying just west of Guadalupe, on the Pecos Valley road, is taken from the El Paso Herald. A number of Eddy parties are interested in the deposits, having been engaged for some time in investigating them. During the past two months E. Miall Skeats, of this city, has spent considerable time there, and The Argus believes that he is very sanguine of the results. The article from the Herald is as follows:

"One of the greatest sources of the as yet undeveloped mineral wealth of El Paso County lies in the extreme northeastern portion of the county, and is in the form of almost limitless deposits of nearly pure sulphur, easily accessible and requiring but little capital (chiefly for refining works) to place it on the market as a finished product. These deposits fill numerous patelliform basins or craters of extinct volcanoes on the plains southeast of the southern point of the Guadalupe Mountains, beginning 2 to 3 miles south of Delaware Creek and 12 miles west of Guadalupe Station, on the Pecos Valley Railroad. So far they are known to exist on some twelve or fourteen sections of land, and are believed to extend over many more, though but twelve claims have been located and these but superficially prospected by shafts usually from 12 to 15 feet in depth, only one being as deep as 30 feet, and all these in nearly pure sulphur to the greatest depth attained. The region round about might be called a prairie, though dotted here and there with low hills overgrown with scrub cedar and covered with the finest grasses. Numerous springs of pure water exist in the vicinity, and Tinnin's great spring ranch lies 6 miles south.

"These basins or craters are usually from 600 to 700 feet in diameter, and toward the center it declines to a depth of 3 or 4 feet, the surface being a thin covering of blackened earth, strongly impregnated with sulphur, and presenting the appearance of having been blackened with sulphuric acid. In one shaft, sunk in the hope of striking water, a liquid was encountered at a depth of 15 feet, but on being tasted it proved to be very strong sulphuric acid, and when the taster hurriedly ejected it from his mouth, adulterated with saliva as it was, it stained deeply and did some injury to his coat sleeve. It is believed, however, that this acid is small in quantity, detained by some solid rock basin, and that it was formed by percolating rain water taking sulphur in solution as it descended.

"As indicating the process by which these vast masses of sulphur were deposited, time has left no trace. As the country round about is gypsum, it might be inferred that both minerals were deposited from sulphur springs, or springs containing sulphide of hydrogen, which sometimes deposits sulphur by the partial oxidation of the hydrogen, and gypsum by the more complete oxidation of the hydrogen. Such springs flowing into a basin lake then covering the region would pour limitless quantities of sulphide of hydrogen (only partially oxidized) down the craters of extinct volcanoes, thus ultimately filling them with sulphur to unknown and probably very great depths, while the impregnated water spread out in the shallow lakes would become more completely oxidized and deposit the gypsum beds now found surrounding the craters. Or, as the craters of extinct volcanoes (as in the case of Popocatapetl) are frequently found plugged with sulphur, it may be that this mineral, in a sublimated state, arose from great depth and was precipitated on the lips and walls of the crater until the orifice was filled. But, whatever the process of deposition may have been, it is certain that these deposits of sulphur are of such vast extent and purity that El Paso is destined to rival the famous sulphur deposits of Sicily, from which island the United States alone formerly imported $50,000,000 worth of sulphur annually.

"Near the surface of the basins in question, where more or less earthy matter has become mixed with the mineral, and even pebbles of foreign rock are embedded, the mass shows only about 60 per cent sulphur, but deeper down the sulphur is found almost pure (98 per cent) and in massive beds, finely lined with varying colors and resembling the finest yellow clay. Twelve different companies have already treated and partially prospected claims, and one of these companies

has projected a railroad from Guadalupe Station, on the Pecos Valley Railroad, to the mines, there being already a fine wagon road to the south, extending 30 miles west from the Pecos Valley road. As these deposits are numerous, doubtless of great extent or depth, and are known to be exceedingly rich, the field is an inviting one for prospectors and small capitalists. The material can be mined and refined at little cost, and can be marketed at wholesale at $32 per ton for roll and $33 to $35 per ton for flour."

REPORT OF THE MINE INSPECTOR.

SILVER CITY, N. MEX., *August 24, 1899.*

SIR: In compliance with section 3 of an act of Congress approved March 3, 1891, entitled "An act for the protection of the lives of miners in the Territories," I herewith beg leave to submit the seventh annual report of this office, covering the fiscal year ended June 30, 1899.

JOHN W. FLEMING,
United States Mine Inspector for the Territory of New Mexico.

His Excellency MIGUEL A. OTERO,
Governor, Santa Fe, N. Mex.

FINANCIAL.

I have the honor to submit the following report of the operations and condition of the treasury for the past two years, from November 30, 1896, to the close of business, June 30, 1899.

Very respectfully, your obedient servant,

J. H. VAUGHN,
Territorial Treasurer.

REVENUES AND EXPENDITURES.

The total revenues and expenditures of the Territory during these two years are shown in the following table:

REVENUES.

Title of fund or account.	1897.	1898.
Licenses	$6,249.52	$63.24
Taxes	194,324.37	252,425.60
Fees paid by district court clerks	8,460.20	7,820.79
Proceeds of convicts' earnings and support of United States prisoners in the New Mexico Penitentiary	6,991.59	7,459.31
Cattle indemnity fund	14,000.00	12,000.00
Interest on deposits	4,263.15	2,718.97
Repayments	126.92	69.58
Insurance companies' licenses	1,080.00	----------
Fees paid by secretary of the Territory	1,065.00	2,519.00
Pullman Palace Car Co.	117.50	91.97
Sale of Compiled Laws of 1897	----------	1,878.50
	236,678.25	287,046.96

Proceeds of capitol rebuilding bonds	$73,125
Proceeds of Insane Asylum bonds	30,000
Money borrowed to complete payment of interest coupons under section 2607, Compiled Laws of 1897	51,600
United States annual appropriation for Agricultural College	47,000

EXPENDITURES.

Interest fund	$64,430.00	[1] $86,142.50
Licenses	4,499.59	135.28
Penitentiary	36,199.91	40,035.05
Salary	34,660.81	35,382.14
Supreme court	856.22	626.75
Miscellaneous	31,778.72	41,373.95
Assessors	9,020.53	9,958.27
Transportation of convicts	3,408.42	4,066.01
Deficit fund forty-fourth fiscal year	38.80	----------
Territorial institutions	59,344.44	42,459.19
Branch agricultural experiment station	85.18	----------
Cattle sanitary board	17,148.72	16,915.37
Interest on deposits	4,111.29	876.76

[1] The excess of the interest payments in 1898 above the annual interest charge represents the payment of arrearages of 1895 and 1896.

EXPENDITURES—Continued.

Title of fund or account.	1897.	1898.
School fund	$1,288.86	$28.34
Deficiency forty-sixth fiscal year	836.39	22.48
Special court fund	1,283.87	3.51
Normal schools	9,326.15	9,025.54
Capitol rebuilding fund	11,547.79	34,323.86
Corporation fund	967.40	1,248.16
Legal expense fund	1,272.25	227.75
Territorial purposes forty-eighth fiscal year	3,214.00	----------
Special tax	----------	21,763.24
Sheep sanitary board	----------	865.00
Compilation fund	----------	1,896.00
	295,318.84	347,315.15

United States annual appropriation for agricultural college	$47,000
Paid notes given for the interest fund	23,600

I respectfully call your attention to the importance of providing additional funds for the interest fund, which is now in arrears to the extent of $40,000, and will be, at the close of the present fiscal year, on the first Monday of March, 1899, to the extent of $55,000, as shown by the following summary:

Treasurer's notes outstanding, given for loans to complete the payment of coupons	$28,000
Interest due up to date of this report	1,874
Interest due January 1, 1899	9,939
Interest due March 1, 1899	15,430
Total arrearage to close of fiscal year	55,243

About $25,000 of this arrearage existed two years ago, and the attention of the last legislature was called to the necessity of making some provision for its payment, but no action was taken. The remainder of the arrearage has arisen during the past two years, from the failure of the cash receipts from taxation to equal the appropriations. I have paid the coupons promptly at their maturity, in all cases, but to do so I have had to borrow from other funds, when conditions permitted, and when this was not possible, I have borrowed under the provisions of section 2607, Compiled Laws. Although I will receive quite a sum for the interest fund, from the tax of 1898, which will soon begin to come into the treasury, yet all this money, and more, will be required to meet the coupons maturing after the beginning of the next fiscal year, so that it is necessary to provide the full amount of the deficiency, $55,000. To lay a tax for this purpose will require about 3 mills of taxation, and will not produce the amount in full, for over a year, and as taxation is already heavy, I suggest the propriety of a short-time bond issue, say ten-year 6 per cent bonds with option to the Territory to redeem at any time after one year from their date, and with the provision for an annual tax beginning in 1899, sufficient to pay all the bonds by the time of their maturity. A tax of one-quarter of 1 mill will be ample to begin with, and the rate can be reduced from year to year. It is of the utmost importance that this or some other provision be made for this fund, as it will not be possible for the treasurer much longer to take care of the coupons as they mature, by the makeshift processes which have answered for the past four years.

LIST OF SCHEDULES ACCOMPANYING THIS REPORT.

No. 1. Statement of the assessed valuation, tax rate, arithmetical and cash product of the rate for the years 1896 and 1897.
No. 2. Appropriations of 1897 and 1898 and cash receipts from the tax levied for their payment.
No. 3. List of depository banks.
No. 4, Special account of moneys paid treasurer by district court clerks.
No. 5. Treasurer's statements of receipts and disbursements for the fourth quarter forty-seventh fiscal year.
No. 6. A similar statement for the forty-eighth fiscal year.
No. 7. A similar statement for the first three-quarters of the forty-ninth fiscal year.
No. 8. Treasurer's general account.
No. 9. List of fire insurance companies.
No. 10. Statement of the Territorial debt.

SCHEDULE No. 1.—*Statement of the assessed valuation, rate of taxation, arithmetical and actual cash product of the rate of taxation and the percentage of the cash product to the arithmetical product in the Territory of New Mexico for the years 1896 and 1897.*

County.	1896—Rate of taxation 7.75 mills.				1897—Rate of taxation 10.80 mills.			
	Assessed valuation.	Arithmetical product of tax.	Actual cash product of tax.	Percentage of cash to arithmetical product.	Assessed valuation.	Arithmetical product of tax.	Actual cash product of tax.	Percentage of cash to arithmetical product.
Bernalillo	$7,145,171.00	$55,375.08	$29,432.62	53	$7,395,184.00	$79,867.89	$35,586.96	44
Chaves	1,911,014.00	14,810.36	12,826.36	86	1,475,829.00	15,938.96	13,087.42	82
Colfax	2,457,110.00	19,042.60	16,735.11	87	2,722,180.00	29,399.55	20,348.01	69
Donna Ana	2,582,865.00	20,017.20	16,758.31	83	2,446,692.85	26,424.28	20,415.60	77
Eddy	1,284,375.00	9,953.91	7,161.04	71	1,113,075.00	12,021.22	8,665.88	61
Grant	3,334,490.00	25,842.30	19,289.79	74	3,468,236.45	37,456.96	23,880.53	63
Guadalupe	494,354.00	3,831.24	2,084.87	54	420,558.00	4,542.04	2,938.58	64
Lincoln	1,419,373.00	11,000.14	9,256.09	84	1,413,832.00	15,269.39	11,943.28	78
Mora	992,430.00	7,691.34	4,772.77	62	968,135.00	10,455.87	6,114.56	57
Rio Arriba	680,205.12	5,271.59	4,692.37	89	800,222.00	8,642.40	5,221.66	60
San Juan	386,927.00	2,998.68	2,071.12	69	729,310.00	7,876.56	2,407.53	30
San Miguel	4,684,105.00	36,301.81	15,979.25	44	4,209,564.00	45,463.29	17,895.36	39
Santa Fe	1,925,613.00	14,923.50	9,320.49	62	1,851,701.00	19,998.38	11,242.40	56
Sierra	1,098,335.00	8,512.10	6,754.15	79	1,055,072.30	11,394.79	9,137.45	80
Socorro	2,389,874.00	18,521.52	13,902.46	75	4,611,482.00	49,804.00	18,200.51	37
Taos	551,271.00	4,272.35	2,429.39	57	953,689.00	10,299.85	3,075.73	30
Union	1,217,550.00	9,436.01	7,959.34	84	1,174,850.00	12,688.38	9,109.98	71
Valencia	2,336,040.36	18,104.31	4,810.44	26	2,668,506.58	28,819.87	6,668.81	23
Total	36,091,192.48	285,906.04	186,325.97	65	39,478,119.18	426,263.68	225,940.25	50

The tax rate of 1896 was:
For Territorial purposes, 6 mills
For Territorial institutions, 1.75 mills.
Included in the above table is a small tax of cattle and sheep but not sufficient to make any material variation on the result given.

The tax rate of 1897 was:
For Territorial purposes, 7 mills.
For Territorial institutions, 2.05 mills.
For special tax, 1.25 mills.
For capitol contingent sinking fund, 0.50 mills.

SCHEDULE No. 2.—*Appropriations of 1897 and 1898; cash receipts from tax levies for their payment and cash product of special taxes for those years.*

Fund.	1897.		1898.	
	Appropriation.	Cash receipts.[1]	Appropriation.	Cash receipts.[2]
Interest fund	$63,440.00		$63,440.00	
Penitentiary current expense fund	51,420.00		40,220.00	
Salary fund	35,120.00		35,120.00	
Supreme court fund	1,200.00		1,200.00	
Miscellaneous fund	54,150.00		48,100.00	
Transportation of convicts	5,000.00		5,000.00	
Total	210,330.00	$136,811.29	193,080.00	$138,370.17

[1] Product of 6 mills taxation for Territorial purposes.
[2] Product of 7 mills taxation for Territorial purposes.

Percentage distributed for the forty-eighth fiscal year 65 per cent.
Percentage distributed for the forty-ninth fiscal year 71 per cent.

SCHEDULE No. 3.—*List of banks holding Territorial funds.*

Name of bank.	Amount applied for.	Amount of bond.	Amount of interest paid.	Balances in bank Dec. 3, 18—.
Albuquerque National Bank, general depository	.....	.....	$962.17	.....
Albuquerque National Bank, special	.....	.....	1,357.50	.....
The Bank of Commerce, Albuquerque, N. Mex	$20,000.00	$40,000.00	133.95	$2,277.96
First National Bank, Las Vegas, N. Mex	30,000.00	60,000.00	987.08	14,087.00
First National Bank, Albuquerque, N. Mex	30,000.00	60,000.00	1,026.56	25,086.89
Taos County Bank	10,000.00	20,000.00	395.36	5,038.42
New Mexico Savings and Trust Co., Albuquerque, N. Mex	.....	.....	.....	1,583.28
San Miguel National Bank, Las Vegas, N. Mex	30,000.00	60,000.00	993.50	14,085.75
First National Bank, Raton, N. Mex	15,000.00	30,000.00	557.07	7,047.35
The Bank of Roswell	15,000.00	30,000.00	548.93	7,048.41
Total	.....	.....	6,962.12	76,255.06

SCHEDULE No. 4.—*Special amount of moneys paid treasurer by the district court clerks.*

Clerk.	District.	Fourth quarter, 1896.	First quarter, 1897.	Second quarter, 1897.	Third quarter, 1897.	Fourth quarter, 1897.	First quarter, 1898.	Second quarter, 1898.	Third quarter, 1898.	Total.	Per cent of fees to salary.
Geo. L. Wyllys	1st.	$288.60	.....	.....	.....	.....	.....	.....	.....	.....	.....
C. H. Gildersleeve	1st.	.....	$246.50	$252.35	$218.10	$337.20	$196.05	.....	.....	.....	.....
A. M. Bergere	1st.	.....	.....	.....	.....	.....	181.41	$215.40	$189.75	$2,125.36	42
O. N. Marron	2d.	293.10	764.65	1,050.00	457.50	468.65	.....	.....	.....	.....	.....
H. P. Owen	2d.	.....	.....	.....	.....	92.90	524.59	453.60	391.95	4,496.94	89
W. B. Walton	3d.	309.10	407.10	420.90	423.85	210.15	223.40	.....	.....	.....	.....
W. P. Mitchell	3d.	.....	.....	.....	.....	.....	.....	601.20	278.95	2,874.65	57
Felix Martinez	4th	415.90	504.05	486.50	541.45	490.35	228.20	.....	.....	.....	.....
Secundino Romero	4th	.....	.....	.....	.....	.....	183.85	218.05	188.70	3,257.05	65
Geo. Curry	5th	64.90	.....	.....	.....	.....	.....	.....	.....	.....	.....
W. M. Driscoll	5th	312.40	298.30	287.90	417.05	626.99	703.60	585.00	.....	.....	.....
J. E. Griffith	5th	.....	.....	.....	.....	.....	.....	.....	230.85	3,526.99	70
Total	.....	1,684.00	2,220.60	2,497.65	2,057.95	2,226.26	2,241.10	2,073.25	1,280.20	16,280.99	46

SCHEDULE NO. 5.—*Receipts and disbursements for the fourth quarter of the forty-seventh fiscal year, beginning November 30, 1896, and ending February 27, 1897.*

Title of fund or account.	Balances Nov. 28, 1896.	Receipts during quarter.	Transfers to funds.	Transfers from funds.	Payments during quarter.	Balances Feb. 27, 1897.
Interest fund	$5,847.78	$116.04	$2,916.94		$5,960.58	$2,920.18
Licenses	667.91	2,610.03			2,186.59	1,091.35
Penitentiary current expense fund	3,615.26		1,788.52		2,387.98	3,015.80
Salary fund	8,097.81	1,684.00	1,835.56		7,901.67	3,715.70
Court fund	157.85		55.16			213.01
Miscellaneous fund	7,478.81		2,379.71		5,863.27	3,995.25
Compensation of assessors fund	1,748.01	3,309.61			4,138.64	918.98
Transportation of convicts	388.91		266.12		339.74	315.29
University of New Mexico	4,221.46	4.30	3,124.52		5,940.00	1,410.28
Agricultural College	397.90	11.18	2,061.42		969.33	1,501.17
New Mexico School of Mines	110.64	2.14	2,010.41		1,000.00	1,123.19
New Mexico Insane Asylum	873.29	2.14	4,455.36		3,443.99	1,886.80
Cattle indemnity fund	2,748.40	4,748.23			5,308.27	2,188.36
Interest on deposits	1,226.19	2,555.69			2,011.17	1,770.71
Deficit fund, forty-second fiscal year	154.60					154.60
Deficiency fund, forty-sixth fiscal year	544.63		289.54			834.17
Special court fund	2,534.99				487.19	2,047.80
Normal school, New Mexico (Silver City)	104.16	21.86	1,976.36		1,247.02	855.36
Normal school, New Mexico (Las Vegas)	389.86	21.85	1,976.36		961.29	1,426.78
Territorial purposes, forty-seventh fiscal year		7,492.49		$7,492.49		
Territorial institutions, forty-seventh fiscal year		2,185.24		2,185.24		
New Mexico Military Institute	920.46		1,901.49			2,821.95
Territorial purposes, forty-eighth fiscal year	546.99	48,755.71			5,851.92	43,450.78
Territorial institutions, forty-eighth fiscal year	159.52	14,293.29		14,452.81		
Territorial purposes, forty-sixth fiscal year		2,039.06		2,039.06		
Territorial institutions, forty-sixth fiscal year		510.74		510.74		
Territorial institutions, forty-fifth fiscal year		357.13		357.13		
Deficit fund, forty-fourth fiscal year	38.80				38.80	
Territorial normal institutes	29.18	9.71				38.89
Branch agricultural experiment station	66.25	18.06			66.25	18.06
School fund	236.70				101.80	134.90
Total	43,306.36	90,748.50	27,037.47	27,037.47	56,205.50	77,849.36

RECAPITULATION

Balances, November 28, 1896	$43,306.36
Receipts during quarter	90,748.50
Total to be accounted for	134,054.86
Payments during quarter	56,205.50
Balances, February 27, 1897	77,849.36

SCHEDULE NO. 6.—*Receipts and disbursements during the forty-eighth fiscal year, March 1, 1897, to March 5, 1898.*

Title of fund or account.	Balances Mar. 1, 1897.	Receipts during quarter.	Transfers to funds.	Transfers from funds.	Payments during quarter.	Balances Mar. 5, 1898.
Interest fund	$2,920.18	$23,609.19	$55,470.00	.....	$69,495.00	$12,504.37
Licenses	1,091.35	3,699.66	.....	$2,344.73	2,446.28	.....
Penitentiary current expense fund	3,015.80	9,388.89	45,187.09	3.11	41,694.16	15,894.51
Salary fund	3,715.70	9,002.44	36,416.43	.....	34,677.79	14,456.78
Court fund	213.01	.....	1,179.96	.....	915.02	477.95
Miscellaneous fund	3,995.25	108.50	50,068.35	12.69	33,768.91	20,390.50
Compensation of assessors fund	918.98	9,515.41	.....	.....	8,898.27	1,536.12
Transportation of convicts	315.29	.....	4,895.65	.....	3,426.35	1,784.59
University of New Mexico	1,410.28	.05	7,210.90	.....	5,550.00	3,071.23
Agricultural College	1,501.17	.47	4,803.92	.....	4,285.75	2,019.81
New Mexico School of Mines	1,123.19	.03	4,802.72	.....	4,805.00	1,120.94
New Mexico Insane Asylum	1,886.80	30,000.03	13,426.95	.....	41,804.26	3,509.52
Cattle indemnity fund	2,188.36	16,990.46	.....	.....	16,090.02	3,088.80
Interest on deposits	1,770.71	2,477.27	.....	.....	2,100.12	2,147.86
Deficit fund, forty-second fiscal year	154.60	.....	.....	.....	.....	154.60
Deficiency fund, forty-sixth fiscal year	834.17	.....	24.70	.....	855.87	3.00
Special court fund	2,047.80	.....	.....	.....	800.19	1,247.61
Normal school, New Mexico (Silver City)	855.36	1.09	4,799.82	.....	4,612.07	1,044.20
Normal school, New Mexico (Las Vegas)	1,426.78	1.09	4,799.82	.....	3,844.63	2,383.06
Territorial purposes, forty-seventh fiscal year	.....	10,688.64	.....	10,688.64	.....	.....
Territorial institutions, forty-seventh fiscal year	.....	3,118.45	.....	3,118.45	.....	.....
New Mexico Military Institute	2,821.95	.....	4,795.96	.....	5,200.00	2,417.91
Territorial purposes, forty-eighth fiscal year	43,450.78	80,474.92	.....	120,711.70	3,214.00	.....
Territorial institutions, forty-eighth fiscal year	.....	23,542.80	.....	23,542.80	.....	.....
Capitol rebuilding fund	.....	73,125.00	.....	.....	14,773.71	58,351.29
Corporation fund	.....	1,834.00	.....	.....	1,626.40	207.60
The legal expense fund	.....	.....	1,500.00	.....	1,272.25	227.75
Territorial purposes, forty-ninth fiscal year	.....	60,768.08	.....	60,768.08	.....	.....
Territorial institutions, forty-ninth fiscal year	.....	17,926.97	.....	17,926.97	.....	.....
Capitol contingent sinking fund	.....	4,520.42	.....	.....	.....	4,520.42
Special tax	.....	10,619.11	.....	.....	.....	10,619.11
Sheep sanitary fund	.....	601.61	.....	.....	.....	601.61
Territorial institutions, forty-fifth fiscal year	.....	8.47	.....	8.47	.....	.....
United States annual appropriation, agricultural college	.....	23,000.00	.....	.....	23,000.00	.....
Territorial normal institutes	38.89	.45	.....	39.34	.....	.....
Branch agricultural experiment station	18.06	.87	.....	.....	18.93	.....
School fund	134.90	1,080.00	.....	.....	1,214.90	.....
Territorial purposes, forty-sixth fiscal year	.....	173.89	.....	173.89	.....	.....
Territorial institutions, forty-sixth fiscal year	.....	43.40	.....	43.40	.....	.....
Total	77,849.36	416,321.66	239,382.27	239,382.27	330,389.88	163,781.14

RECAPITULATION.

Balances, March 1, 1897	$77,849.36
Receipts during the forty-eighth fiscal year	416,321.66
Total to be accounted for	494,171.02
Payments during the forty-eighth fiscal year	330,389.88
Balances, March 5, 1898	163,781.14

SCHEDULE No. 7.—*Receipts and disbursements three quarters of the forty-ninth fiscal year, March 7, 1898, to December 3, 1898.*

Title of fund or account.	Balances Mar. 7, 1898.	Receipts during quarter.	Transfers to funds.	Transfers from funds.	Payments during quarter.	Balances Dec. 3, 1898.
Interest fund	$12,504.37	$28,000.00	$28,765.58		$39,265.00	$4.95
Licenses		12.27			2.00	10.27
Penitentiary current expense fund	15,894.51	5,062.01	18,509.52		32,152.82	7,313.22
Salary fund	14,456.78	5,594.55	15,965.19		27,463.49	8,553.03
Court fund	477.95		528.40		567.95	438.40
Miscellaneous fund	20,390.50		22,014.50		33,520.49	8,884.51
Compensation of assessor's fund	1,530.12	5,751.79			5,941.89	1,346.02
Transportation of convicts	1,784.59		2,284.91		3,708.34	361.16
University of New Mexico	3,071.23		3,799.75		6,190.00	680.98
Agricultural college	2,019.81		2,533.15		4,149.52	403.44
New Mexico School of Mines	1,120.94		2,533.15		2,850.00	804.09
New Mexico Insane Asylum	3,509.52		8,981.75		11,115.78	1,375.49
Cattle indemnity fund	3,088.80	9,923.55			12,665.80	346.55
Interests on deposits	2,147.86	1,949.16			876.76	3,220.26
Deficit fund, forty-second fiscal year	154.60					154.60
Defic ency fund, forty-sixth fiscal year	3.00				3.00	
Special court fund	1,247.61					1,247.61
Normal school, New Mexico, (Silver City)	1,044.20		2,533.15		3,173.91	403.44
Normal school, New Mexico (Las Vegas)	2,383.06		2,533.15		4,512.77	403.44
Territorial purposes, forty-seventh fiscal year		3,146.87		$3,146.87		
Territorial institutions, forty-seventh fiscal year		918.48		918.48		
New Mexico Military Institute	2,417.91		2,533.15		4,500.00	451.06
Territorial purposes, forty-eighth fiscal year		7,151.17		7,151.17		
Territorial institutions, forty-eighth fiscal year		2,100.52		2,100.52		
Capitol rebuilding fund	58,361.29	69.58			31,097.94	27,332.93
Corporation fund	207.60	1,674.00		1,292.44	589.16	
The legal expense fund	227.75				227.75	
Territorial purposes, forty-ninth fiscal year		76,477.62	1,292.44	77,770.06		
Territorial institutions, forty-ninth fiscal year		22,428.25		22,428.25		
Capitol contingent sinking fund	4,520.42	5,528.87				10,049.29
Special tax	10,619.11	13,886.48			21,763.24	2,742.35
Sheep sanitary fund	601.61	912.49			865.00	649.10
Compilation fund		1,878.50			1,836.00	42.50
Territorial purposes, fiftieth fiscal year		1,477.72				1,477.72
Territorial institutions, fiftieth fiscal year		436.17				436.17
United States annual appropriation, agricultural college		24,000.00			24,000.00	
Total	163,781.14	218,380.05	114,807.79	114,807.79	303,088.61	79,122.58

RECAPITULATION.

Balances, March 7, 1898	$163,781.14
Receipts during the three quarters of the forty-ninth fiscal year	218,380.05
Total to be accounted for	382,161.19
Payments during the three quarters of the forty-ninth fiscal year	303,088.61
Balances, December 3, 1898	79,122.58

SCHEDULE No. 8.—*Samuel Eldodt, Territorial treasurer, in account with the Territory of New Mexico.*

DR.					CR.
Nov. 28, 1896	To balance on hand	$43,746.49	Nov. 20, 1897	By warrants, coupons, and other paid evidences of indebtedness destroyed, as per certificate of governor and auditor	$295,136.35
	Receipts from all sources from Nov 30, 1896, to Dec 3, 1898, both dates inclusive, from taxes paid by collectors	446,930.91	Nov. 29, 1898	By warrants, coupons, and other paid evidences of indebtedness destroyed, as per certificate of governor and auditor	385,313.06
	From taxes paid by county treasurers	3,857.40	Dec. 3, 1898	By balance on hand	88,747.29
	From taxes paid by district attorneys	1,534.59			
	From taxes paid per order of court	739.83			
	From fees paid by district court clerks	16,280.99			
	From cattle sanitary board	26,000.00			
	From interest on deposits	6,982.12			
	From proceeds of convicts' earnings and support of United States prisoners, from superintendent of New Mexico penitentiary	14,450.90			
	Pullman Palace Car Company	209.47			
	Repayments	196.50			
	Proceeds of capitol rebuilding bonds	73,125.00			
	Proceeds of Insane Asylum	30,000.00			
	From Auditor, insurance company licenses	1,080.00			
	From sale of Compiled Laws of 1897	1,878.50			
	Money borrowed to complete payment of interest coupons under section 2607, Compiled Laws of 1897	51,600.00			
	United States annual appropriation for the college of agriculture and mechanic arts, Las Cruces	47,000.00			
	From fees paid by the secretary of the Territory of New Mexico	3,584.00			
	Total	769,196.70		Total	769,196.70

Balance consists of—

Cash on hand in bank	$79,122.58
Warrants paid since November 21, 1898	2,824.71
Coupons paid since November 21, 1898	6,800.00

SCHEDULE No. 9.—*List of fire insurance companies that complied with chapter 49, laws of 1897.*

Name of company.	Location.	Kind of security.	
Ætna Fire Insurance Co	Hartford, Conn	Capitol rebuilding bonds of the Territory of New Mexico.	$10,000
American Central	St. Louis, Mo	Cash deposit	10,000
Atlas Fire Assurance Co	London, England	Provisional indebtedness bonds $1,000, casual deficit bonds $6,000, refunding bonds $3,000.	10,000
British America Assurance Co	Toronto, Canada	Real estate mortgage	10,000
Continental Insurance Co	New York, N. Y	Provisional indebtedness bonds of the Territory of New Mexico.	10,000
Fire Association of Philadelphia	Philadelphia, Pa	Real estate mortgage	11,000
Fireman's Fund Insurance Co	San Francisco, Cal	Cash deposit	10,000
Hartford Fire Insurance Co	Hartford, Conn	Real estate mortgage	10,000
Insurance Company of North America.	Philadelphia, Pa	Provisional bonds of the Territory of New Mexico $2,000, Grant County funding bonds $8,000.	10,000
Liverpool and London and Globe Insurance Co.	Liverpool, England	Funding bonds of Socorro County $5,000, funding bonds of Bernalillo County $5,000.	10,000
London and Lancashire Insurance Co.	do	Grant County, N. Mex., railroad bonds.	10,000
National Fire Insurance Co	Hartford, Conn	City of Silver City, N. Mex., gold refunding bonds.	10,000
North British and Mercantile Insurance Co.	London, England	Territorial institutions bonds of the Territory of New Mexico.	10,000
Niagara Fire Insurance Co	New York, N. Y	Provisional indebtedness bonds of the Territory of New Mexico.	10,000
Northern Assurance Co	London, England	Cash deposit	10,000
Norwich Union Fire Insurance Co.	Norwich, England	Capitol contingent fund bonds $5,000, cash deposit $5,000.	10,000
Orient Fire Insurance Co	Hartford, Conn	Cash deposit	10,000
Palatine Insurance Co	Manchester, England.	Real estate mortgage $8,000, cash deposit $2,000.	10,000
Royal Insurance Co	Liverpool, England	Capitol contingent fund bonds of the Territory of New Mexico.	10,000
Scottish Union and National Insurance Co.	Edinburgh, Scotland	Cash deposit	10,000
Springfield Fire and Marine Insurance Co.	Springfield, Mass	Real estate mortgage	10,000
St. Paul Fire and Marine Insurance Co.	St. Paul, Minn	Grant County current expense bonds $3,000, Grant County funding bonds $7,000.	10,000

SCHEDULE NO. 10.—*Statement of the debt of the Territory of New Mexico.*

Title of bond.	Law of issue.	Amount outstanding.	Date of bond.	Rate of interest.	When interest is payable.
				P. ct.	
Capitol building bonds.	Sec. 2527, C. L.	$100,000	Sept. 1, 1884	7	March and September.
		100,000	Mar. 1, 1885		
Capitol contingent fund bonds.	Chap. 45, Laws of 1887, p 88	50,000	Apr. 1, 1887	6	January and July.
Current expense bonds.	Chap. 44, Laws of 1887, p. 86	50,000	May 2, 1887	6	May.
		50,000	Nov. 1, 1887		November.
		50,000	May 1, 1888		May.
Provisional indebtedness bonds.	Chap. 122, Laws of 1889, p. 295.	100,000	May 1, 1889	6	March and September.
		100,000	Sept. 2, 1889		
Insane Asylum bonds.	Chap. 39, Laws of 1891, p. 87	25,000	Oct. 1, 1891	6	January and July.
Casual deficit bonds.	Sec. 7, chap. 61, Laws of 1893, p. 102.	101,800	May 1, 1893	5	Do.
Refunding bonds.	Sec. 7, chap. 61, Laws of 1893, p. 104.	104,000	July 1, 1893	6	Do.
Penitentiary refunding bonds.	Sec. 11, chap. 61, Laws of 1893, p. 105.	71,000	July 1, 1894	6	March and September.
		10,000	Jan. 1, 1895		
Territorial institution bonds.	Sec. 1, chap. 44, Laws of 1895.	35,000	July 1, 1895	5	January and July.
New Mexico Military Institute bonds.	Sec. 1, chap. 42, Laws of 1895.	15,000	.....do.....	5	Do.
Insane Asylum bonds.	Sec. 1, chap. 43, Laws of 1895.	30,000	.....do.....	5	Do.
Capitol rebuilding bonds.	Sec. 7, chap. 39, Laws of 1895.	25,000	May 1, 1895	5	May and November.
		50,000	Nov. 1, 1895		
Capitol rebuilding bonds (second series).	Sec. 1, chap. 9, Laws of 1899	60,000	May 1, 1899	4	Do.
Certificates of indebtedness, series A.	Sec. 1, chap. 59, Laws of 1899.	47,000	.....do.....	6	March and September.
Certificates of indebtedness, series B.	Sec. 1, chap. 59, laws of 1899	62,400	.....do.....	6	Do.
Approved claims to be refunded by certificates of indebtedness, series B.	Sec. 1, chap. 59, laws of 1899	7,200	.....do.....	6	Do.

Total Territorial debt, June 30, 1899, $1,243,400.

Quarterly statement of the Territorial treasurer of New Mexico, fourth quarter of the forty-eighth fiscal year, beginning November 29, 1897, and ended March 5, 1898.

Title of fund or account.	Balances Nov. 29, 1897.	Receipts during quarter.	Transfers to funds.	Transfers from funds.	Payments during quarter.	Balances Mar. 5, 1898.
Interest fund	$6,841.04		$22,540.83		$16,877.50	$12,504.37
Licenses	2,417.84	$60.17		$2,344.73	133.28	
Penitentiary current expense fund	6,878.04	2,397.30	14,504.51	3.11	7,882.23	15,894.51
Salary fund	5,332.44	2,226.24	14,816.75		7,918.65	14,456.78
Court fund	123.49		413.26		58.80	477.95
Miscellaneous fund	11,039.30		17,217.35	12.69	7,853.46	20,390.50
Compensation of assessors fund	944.95	4,607.55			4,016.38	1,536.12
Transportation of convicts	357.67		1,784.59		357.67	1,784.59
University of New Mexico	791.47		3,029.76		750.00	3,071.23
Agricultural college	2,148.07		2,019.81		2,148.07	2,019.81
New Mexico School of Mines	381.13		2,019.81		1,280.00	1,120.94
New Mexico Insane Asylum	5,817.29		7,168.05		9,475.82	3,509.52
Territorial normal institutes	39.34			39.34		
Cattle indemnity fund	1,511.73	5,826.64			4,249.57	3,088.80
School fund	28.34				28.34	
Interest on deposits	1,378.05	769.81				2,147.86
Deficit fund, forty-second fiscal year	154.60					154.60
Deficiency fund, forty-sixth fiscal year	22.48				19.48	3.00
Special court fund	1,251.12				3.51	1,247.61
Normal school, New Mexico (Silver City)	363.25		2,019.81		1,338.86	1,044.20
Normal school, New Mexico (Las Vegas)	363.25		2,019.81			2,383.06
Territorial purposes, forty-seventh fiscal year		1,998.67		1,998.67		
Territorial institutions, forty-seventh fiscal year		583.66		583.66		
New Mexico Military Institute	398.10		2,019.81			2,417.91
Territorial purposes, forty-eighth fiscal year		6,110.67		6,110.67		
Territorial institutions, forty-eighth fiscal year		1,786.23		1,786.23		
Capitol rebuilding fund	61,577.21				3,225.92	58,351.29
Corporation fund	97.60	769.00			659.00	207.60
The legal expense fund	227.75					227.75
United States annual appropriation for agricultural college	23,000.00				23,000.00	
Territorial purposes, forty-ninth fiscal year	567.48	60,200.60		60,768.08		
Territorial institutions, forty-ninth fiscal year	180.51	17,746.46		17,926.97		
Capitol contingent sinking fund	40.52	4,479.90				4,520.42
Special tax	101.33	10,517.78				10,619.11
Sheep sanitary fund	15.38	586.23				601.61
Total	134,390.77	120,666.91	91,574.15	91,574.15	91,276.54	163,781.14

RECAPITULATION.

Balances November 29, 1897	$134,390.77
Receipts during quarter	120,666.91
Total to be accounted for	255,057.68
Payments during quarter	91,276.54
Balances March 5, 1898	163,781.14

DISPOSITION OF FUNDS.

First National Bank of Santa Fe	$14,266.77
Bank of Commerce, Albuquerque	2,226.84
First National Bank of Las Vegas	29,508.89
First National Bank of Albuquerque	29,490.28
Taos County Bank	9,734.07
New Mexico Savings Bank and Trust Company	1,583.28
San Miguel National Bank	29,476.70
First National Bank of Raton	14,772.47
The Bank of Roswell	14,641.71
National Bank of Commerce of New York	18,085.13
Total	163,781.14
Funds not available	1,583.28
Funds available	162,197.86
Deduct interest due	18,085.13
Free cash balance	144,112.73

Quarterly statement of the Territorial treasurer of New Mexico, first quarter of the forty-ninth fiscal year, beginning March 7, 1898, and ending May 28, 1898.

Title of fund or account.	Balances Mar. 7, 1898.	Receipts during quarter.	Transfers to funds.	Transfers from funds.	Payments during quarter.	Balances May 28, 1898.
Interest fund	$12,504.37		$5,187.26		$12,500.00	$5,191.63
Licenses		$3.07				3.07
Penitentiary current expense fund	15,894.51	1,901.49	3,414.71		6,591.60	14,619.11
Salary fund	14,456.78	2,241.10	2,886.95		8,284.05	11,300.78
Court fund	477.95		96.12		92.00	482.07
Miscellaneous fund	20,390.50		4,021.81		10,186.94	14,225.37
Compensation of assessors fund	1,536.12	1,046.35			1,528.52	1,053.95
Transportation of convicts	1,784.59		413.88		1,774.44	424.03
University of New Mexico	3,071.23		719.11		3,000.00	790.34
Agricultural college	2,019.81		479.40		2,019.81	479.40
New Mexico School of Mines	1,120.94		479.40		1,000.00	600.34
New Mexico Insane Asylum	3,509.52		1,600.32		3,509.52	1,600.32
Cattle indemnity fund	3,088.80	2,223.49			4,470.99	841.30
Interest on deposits	2,147.86	822.80			500.00	2,470.66
Deficit fund, forty-second fiscal year	154.60					154.60
Deficiency fund, forty-sixth fiscal year	3.00				3.00	
Special court fund	1,247.61					1,247.61
Normal school, New Mexico (Silver City)	1,044.20		479.40		1,044.20	479.40
Normal school, New Mexico (Las Vegas)	2,383.06		479.40		2,383.06	479.40
Territorial purposes, forty-seventh fiscal year		1,048.31		$1,048.31		
Territorial institutions, forty-seventh fiscal year		305.47		305.47		
New Mexico Military Institute	2,417.91		479.40		2,400.00	497.31
Territorial purposes, forty-eighth fiscal year		2,900.57		2,900.57		
Territorial institutions, forty-eighth fiscal year		846.21		846.21		
Capitol rebuilding fund	58,351.29				5,027.29	53,324.00
Corporation fund	207.60	1,021.00			588.16	640.44
The legal expense fund	227.75					227.75
Territorial purposes, forty-ninth fiscal year		12,071.85		12,071.85		
Territorial institutions, forty-ninth fiscal year		3,564.75		3,564.75		
Capitol contingent sinking fund	4,520.42	856.72				5,377.14
Special tax	10,619.11	2,139.63			9,377.64	3,381.10
Sheep sanitary fund	601.61	264.10				865.71
Compilation fund		161.50				161.50
Total	168,781.14	33,418.41	20,737.16	20,737.16	76,281.22	120,918.33

RECAPITULATION.

Balances March 7, 1898	$163,781.14
Receipts during quarter	33,418.41
Total to be accounted for	197,199.55
Payments during quarter	76,281.22
Balances May 28, 1898	120,918.33

DISPOSITION OF FUNDS.

First National Bank of Santa Fe	$1,686.47
Bank of Commerce, Albuquerque	2,243.38
First National Bank of Las Vegas	20,683.20
First National Bank of Albuquerque	20,670.95
Taos County Bank	7,100.09
New Mexico Savings Bank and Trust Company	1,583.28
San Miguel National Bank	20,659.45
First National Bank of Raton	10,070.94
The Bank of Roswell	10,040.75
National Bank of Commerce of New York	25,979.82
Total	120,918.33
Funds not available	1,583.28
Funds available	119,335.05
Deduct interest due	25,979.82
Free cash balance	93,355.23

Quarterly statement of the Territorial treasurer of New Mexico, second quarter of the forty-ninth fiscal year, beginning May 30, 1898, and ending September 3, 1898.

Title of fund or account.	Balances May 30, 1898.	Receipts during quarter.	Transfers to funds.	Transfers from funds.	Payments during quarter.	Balances Sept. 3, 1898.
Interest fund	$5,191.63	$12,500.00	$19,113.48	.....	$36,510.00	$295.11
Licenses	3.07	.....	.....	.....	2.00	1.07
Penitentiary current expense fund	14,619.11	1,410.80	12,194.46	.....	17,845.56	10,378.81
Salary fund	11,300.78	2,073.25	10,592.30	.....	9,534.03	14,432.30
Court fund	482.07	.....	349.89	.....	103.00	728.96
Miscellaneous fund	14,225.37	.....	14,550.44	.....	14,326.79	14,449.02
Compensation of assessors fund	1,053.95	3,870.14	.....	.....	3,220.08	1,704.01
Transportation of convicts	424.03	.....	1,514.67	.....	1,440.16	498.54
University of New Mexico	790.34	.....	2,475.48	.....	790.00	2,475.82
Agriculture College	479.40	.....	1,650.31	.....	479.40	1,650.31
New Mexico School of Mines	600.34	.....	1,650.31	.....	600.00	1,650.65
New Mexico Insane Asylum	1,600.32	.....	6,005.94	.....	5,258.85	2,347.41
Cattle indemnity fund	841.30	5,429.29	.....	.....	3,922.75	2,347.84
Interests on deposits	2,470.66	550.84	.....	.....	254.16	2,767.34
Deficit fund, forty-second fiscal year	154.60	.....	.....	.....	.....	154.60
Special court fund	1,247.61	.....	.....	.....	.....	1,247.61
Normal School, New Mexico (Silver City)	479.40	.....	1,650.31	.....	479.40	1,650.31
Normal School, New Mexico (Las Vegas)	479.40	.....	1,650.31	.....	479.40	1,650.31
Territorial purposes, forty-seventh fiscal year	.....	1,135.87	.....	$1,135.87	.....	.....
Territorial institutions, forty-seventh fiscal year	.....	332.39	.....	332.39	.....	.....
New Mexico Military Institute	497.31	.....	1,650.31	.....	.....	2,147.62
Territorial purposes, forty-eighth fiscal year	.....	2,464.78	.....	2,464.78	.....	.....
Territorial institutions, forty-eighth fiscal year	.....	733.43	.....	733.43	.....	.....
Capitol rebuilding fund	53,324.00	69.58	.....	.....	13,753.25	39,640.33
Corporation fund	640.44	653.00	.....	1,292.44	1.00	.....
The legal expense fund	227.75	.....	.....	.....	.....	227.75
Territorial purposes, forty-ninth fiscal year	.....	53,422.15	1,292.44	54,714.59	.....	.....
Territorial institutions, forty-ninth fiscal year	.....	15,667.15	.....	15,667.15	.....	.....
Capitol contingent sinking fund	5,377.14	3,773.90	.....	.....	.....	9,151.04
Special tax	3,381.10	9,542.19	.....	.....	1,389.99	11,533.30
Sheep sanitary fund	865.71	430.25	.....	.....	865.00	430.96
Compilation fund	161.50	1,309.00	.....	.....	1,000.00	470.50
United States annual appropriation for agriculture college	.....	24,000.00	.....	.....	24,000.00	.....
Total	120,918.33	139,368.01	76,340.65	76,340.65	136,254.82	124,081.52

RECAPITULATION.

Balances May 30, 1898	$120,918.33
Receipts during quarter	139,368.01
Total to be accounted for	260,286.34
Payments during quarter	136,254.82
Balances September 3, 1898	124,081.52

DISPOSITION OF FUNDS.

First National Bank of Santa Fe	$605.28
Bank of Commerce, Albuquerque	2,260.61
First National Bank of Las Vegas	23,564.10
First National Bank of Albuquerque	23,564.52
Taos County Bank	8,546.07
New Mexico Savings Bank and Trust Company	1,583.28
San Miguel National Bank	23,564.50
First National Bank of Raton	11,540.33
The Bank of Roswell	11,509.67
National Bank of Commerce of New York	17,293.16
Total	124,081.52
Funds not available	1,583.28
Funds available	122,448.24
Deduct interest due	17,293.16
Free cash balance	105,155.08

Quarterly statement of the Territorial treasurer of New Mexico, third quarter of the forty-ninth fiscal year, beginning September 5, 1898, and ending December 3, 1898.

Title of fund or account.	Balances Sept. 5, 1898.	Receipts during quarter.	Transfers to funds.	Transfers from funds.	Payments during quarter.	Balances Dec. 3, 1898.
Interest fund	$295.11	$15,500.00	$4,464.84		$20,255.00	$4.95
Licenses	1.07	9.20				10.27
Penitentiary current expense fund	10,378.81	1,749.72	2,900.35		7,715.66	7,313.22
Salary fund	14,432.30	1,280.20	2,485.94		9,645.41	8,553.03
Court fund	728.96		82.39		372.95	438.40
Miscellaneous fund	14,449.02		3,442.25		9,006.76	8,884.51
Compensation of assessors fund	1,704.01	835.30			1,193.29	1,346.02
Transportation of convicts	498.54		356.36		493.74	361.16
University of New Mexico	2,475.82		605.16		2,400.00	680.98
Agriculture College	1,650.31		403.44		1,650.31	403.44
New Mexico School of Mines	1,650.65		403.44		1,250.00	804.09
New Mexico Insane Asylum	2,347.41		1,375.49		2,347.41	1,375.49
Cattle indemnity fund	2,347.84	2,270.77			4,272.06	346.55
Interests on deposits	2,767.34	575.52			122.60	3,220.26
Deficit fund forty-second fiscal year	154.60					154.60
Special court fund	1,247.61					1,247.61
Normal School, New Mexico (Silver City)	1,650.31		403.44		1,650.31	403.44
Normal School, New Mexico (Las Vegas)	1,650.31		403.44		1,650.31	403.44
Territorial purposes, forty-seventh fiscal year		962.69		$962.69		
Territorial institutions, forty-seventh fiscal year		280.62		280.62		
New Mexico Military Institute	2,147.62		403.44		2,100.00	451.06
Territorial purposes, forty-eighth fiscal year		1,785.82		1,785.82		
Territorial institutions, forty-eighth fiscal year		520.88		520.88		
Capitol rebuilding fund	39,640.33				12,317.40	27,322.93
The legal expense fund	227.75				227.75	
Territorial purposes, forty-ninth fiscal year		10,983.62		10,983.62		
Territorial institutions, forty-ninth fiscal year		3,196.35		3,196.35		
Capitol contingent sinking fund	9,151.04	898.25				10,049.29
Special tax	11,533.30	2,204.66			10,995.61	2,742.35
Sheep sanitary fund	430.96	218.14				649.10
Compilation fund	470.50	408.00			836.00	42.50
Territorial purposes, fiftieth fiscal year		1,477.72				1,477.72
Territorial institutions, fiftieth fiscal year		436.17				436.17
Total	124,031.52	45,598.63	17,729.98	17,729.98	90,502.57	79,122.58

RECAPITULATION.

Balances September 5, 1898	$124,031.52
Receipts during quarter	45,598.63
Total to be accounted for	169,625.15
Payments during quarter	90,502.57
Balances December 3, 1898	79,122.58

DISPOSITION OF FUNDS.

First National Bank of Santa Fe	$992.81
Bank of Commerce, Albuquerque	2,277.96
First National Bank of Las Vegas	14,087.00
First National Bank of Albuquerque	25,086.89
Taos County Bank	5,038.42
New Mexico Savings Bank and Trust Company	1,583.28
San Miguel National Bank	14,085.75
First National Bank of Raton	7,047.35
The Bank of Roswell	7,048.41
National Bank of Commerce of New York	1,874.71
Total	79,122.58
Funds not available	1,583.28
Funds available	77,539.30
Deduct interest due	1,874.71
Free cash balance	75,664.59

Quarterly statement of the Territorial treasurer of New Mexico, fourth quarter of the forty-ninth fiscal year, beginning December 5, 1898, and ending March 4, 1899.

Title of fund or account.	Balances Dec. 5, 1898.	Receipts during quarter.	Transfers to funds.	Transfers from funds.	Payments during quarter.	Balances Mar. 4, 1899.
Interest fund	$4.95		$2,989.79			$2,994.74
Licenses	10.27	$88.49			$75.00	23.76
Penitentiary current expense fund	7,313.22	1,051.21	1,957.06		7,170.83	3,150.66
Salary fund	8,553.03	1,671.70	1,669.49		8,691.81	3,202.41
Court fund	438.40		55.38		237.45	256.33
Miscellaneous fund	8,884.51		2,319.47		6,951.78	4,252.20
Compensation of assessors fund	1,346.02	4,902.15			3,909.79	2,338.88
Transportation of convicts	361.16		239.66		329.22	271.60
University of New Mexico	680.98		3,212.69		2,130.00	1,763.67
Agriculture College	403.44		2,141.79		1,379.05	1,166.18
New Mexico School of Mines	804.09		2,141.79		1,750.00	1,195.88
New Mexico Insane Asylum	1,375.49		7,906.24		5,084.02	4,247.71
Cattle indemnity fund	346.55	7,763.42			4,808.91	3,301.06
Interests on deposits	3,220.26	518.21			3,570.29	168.18
Deficit fund, forty-second fiscal year	154.60					154.60
Special court fund	1,247.61					1,247.61
Normal School, New Mexico (Silver City)	403.44		2,141.79		1,379.05	1,166.18
Normal School, New Mexico (Las Vegas)	403.44		2,141.79		1,379.05	1,166.18
Territorial purposes, forty-seventh fiscal year		934.07		$934.07		
Territorial institutions, forty-seventh fiscal year		271.87		271.87		
New Mexico Military Institute	451.06		2,141.79		400.00	2,192.85
Territorial purposes, forty-eighth fiscal year		1,573.76		1,573.76		
Territorial institutions, forty-eighth fiscal year		459.83		459.83		
Capitol rebuilding fund	27,322.93				8,679.81	18,643.12
Territorial purposes, forty-ninth fiscal year		6,723.02		6,723.02		
Territorial institutions, forty-ninth fiscal year		1,918.55		1,918.55		
Capitol contingent sinking fund	10,049.29	5,014.55				15,063.84
Special tax	2,742.35	12,542.71			1,412.66	13,872.40
Sheep sanitary fund	649.10	640.51			998.47	291.14
Compilation fund	42.50	263.50			212.50	93.50
Territorial purposes, fiftieth fiscal year	1,477.72	60,766.92			6,695.05	55,549.59
Territorial institutions, fiftieth fiscal year	436.17	18,741.46		19,177.63		
Total	79,122.58	125,845.93	31,058.73	31,058.73	67,194.24	137,774.27

RECAPITULATION.

Balances December 5, 1898	$79,122.58
Receipts during quarter	125,845.93
Total to be accounted for	204,968.51
Payments during quarter	67,194.24
Balances March 4, 1899	137,774.27

DISPOSITION OF FUNDS.

First National Bank of Santa Fe	$8,156.35
Bank of Commerce, Albuquerque	2,295.42
First National Bank of Las Vegas	20,185.00
First National Bank of Albuquerque	25,807.58
Taos County Bank	8,077.10
New Mexico Savings Bank and Trust Company	1,583.28
San Miguel National Bank	20,182.50
First National Bank of Raton	12,102.16
The Bank of Roswell	12,101.80
National Bank of Commerce of New York	26,907.14
Western National Bank of New York	375.94
Total	137,774.27
Funds not available	1,583.28
Funds available	136,190.99
Deduct interest due	27,283.08
Free cash balance	108,907.91

Quarterly statement of the Territorial treasurer of New Mexico, first quarter of the fiftieth fiscal year, beginning March 6, 1899, and ending June 3, 1899.

Title of fund or account.	Balances Mar. 6, 1899.	Receipts during quarter.	Transfers to funds.	Transfers from funds.	Payments during quarter.	Balances June 3, 1899.
Interest fund	$2,994.74	.....	$30,658.47	.....	$33,653.21	.....
Licenses	23.76	.....	.....	.....	23.76	.....
Penitentiary current expense fund	3,150.66	$1,250.31	14,824.47	.....	11,916.02	$7,309.42
Salary fund	3,202.41	1,230.95	14,294.83	.....	7,050.57	11,727.62
Court fund	256.33	.....	231.74	.....	130.52	357.55
Miscellaneous fund	4,252.20	.....	15,178.23	.....	8,421.94	11,008.49
Compensation of assessors fund	2,338.88	1,662.89	.....	.....	2,695.39	1,306.38
Transportation of convicts	271.60	.....	.....	$13.79	257.81	.....
University of New Mexico	1,763.67	.....	961.36	.....	1,750.00	975.03
Agriculture College	1,166.18	.....	640.90	.....	1,166.18	640.90
New Mexico School of Mines	1,195.88	.....	640.90	.....	1,195.88	640.90
New Mexico Insane Asylum	4,247.71	.....	2,403.39	.....	4,247.71	2,403.39
Cattle indemnity fund	3,301.06	872.65	.....	.....	3,307.06	866.65
Interests on deposits	168.18	673.66	.....	.....	274.96	566.88
Deficit fund, forty-second fiscal year	154.60	.....	.....	.....	.....	154.60
Special court fund	1,247.61	.....	.....	.....	1.90	1,245.71
Normal School, New Mexico (Silver City)	1,166.18	.....	640.90	.....	1,166.18	640.90
Normal School, New Mexico (Las Vegas)	1,166.18	.....	640.90	.....	1,166.18	640.90
Territorial purposes, forty-seventh fiscal year	.....	553.04	.....	553.04	.....	.....
Territorial institutions, forty-seventh fiscal year	.....	162.19	.....	162.19	.....	.....
New Mexico Military Institute	2,192.85	.....	640.90	.....	2,100.00	733.75
Territorial purposes, forty-eighth fiscal year	.....	561.01	.....	208.30	352.71	.....
Territorial institutions, forty-eighth fiscal year	.....	163.71	.....	163.71	.....	.....
Capitol rebuilding fund	18,643.12	.....	.....	.....	9,608.41	9,034.71
Territorial purposes, forty-ninth fiscal year	.....	1,994.07	.....	1,994.07	.....	.....
Territorial institutions, forty-ninth fiscal year	.....	453.19	.....	453.19	.....	.....
Capitol contingent sinking fund	15,063.84	1,520.32	.....	.....	.....	16,584.16
Special tax	13,872.40	3,806.30	.....	.....	12,767.05	4,911.65
Sheep sanitary fund	291.14	374.95	.....	.....	.....	666.09
Compilation fund	93.50	68.00	.....	.....	102.00	59.50
Territorial purposes, fiftieth fiscal year	55,549.59	22,857.65	2,755.41	75,173.95	5,988.70	.....
Territorial institutions, fiftieth fiscal year	.....	5,790.16	779.09	6,569.25	.....	.....
Total	137,774.27	44,045.05	85,291.49	85,291.49	109,344.14	72,475.18

RECAPITULATION.

Balances March 6, 1899	$137,774.27
Receipts during quarter	44,045.05
Total to be accounted for	181,819.32
Payments during quarter	109,344.14
Balances June 3, 1899	72,475.18

DISPOSITION OF FUNDS.

First National Bank of Santa Fe	$5,950.31
Bank of Commerce, Albuquerque	2,312.86
First National Bank of Las Vegas	11,000.00
First National Bank of Albuquerque	11,000.00
Taos County Bank	4,130.39
New Mexico Savings Bank and Trust Company	1,583.28
San Miguel National Bank	11,000.00
First National Bank of Raton	5,500.00
The Bank of Roswell	5,500.00
National Bank of Commerce of New York	10,626.55
Cash items	3,871.79
Total	72,475.18
Funds not available	1,583.28
Funds available	70,891.90
Deduct interest due	14,498.34
Free cash balance	56,393.56

Quarterly statement of the Territorial treasurer of New Mexico, second quarter of the fiftieth fiscal year, beginning June 4, 1899, and ending September 2, 1899.

Title of fund or account.	Balances June 4, 1899.	Receipts during quarter.	Transfers to funds.	Transfers from funds.	Payments during quarter.	Balances Sept. 2, 1899.
Miscellaneous fund:						
Forty-second fiscal year	$56.00					$56.00
Forty-third fiscal year	37.50					37.50
Forty-seventh fiscal year	5.00					5.00
Fiftieth fiscal year	10,909.99		$16,712.99		$13,129.96	4,492.02
Compensation of assessors' fund:						
Forty-second fiscal year	7.85					7.85
Fiftieth fiscal year	1,298.53	$5,300.32			3,326.21	3,272.64
Deficit fund forty-second fiscal year	154.60					154.60
Deficiency fund fiftieth fiscal year		2,475.00			10.00	2,465.00
Interest fund		11,008.65	26,274.03		40,668.95	33,593.73
Proceeds 37 certificates of indebtedness		37,000.00				
Interests on deposits	566.88	522.73			134.75	954.86
University of New Mexico	975.03		3,167.69		2,731.13	1,411.59
Agricultural college	640.90		2,111.79		640.90	2,111.79
New Mexico School of Mines	640.90		2,111.79		640.90	2,111.79
New Mexico Insane Asylum	2,403.39		7,919.24		6,793.64	3,528.99
New Mexico Military Institute	733.75		2,111.79		1,900.00	945.54
Normal School, New Mexico, (Silver City)	640.90		2,111.79		640.90	2,111.79
Normal School, New Mexico, (Las Vegas)	640.90		2,111.79		1,811.63	941.06
Penitentiary current expense fund:						
Forty-seventh fiscal year		768.97			68.50	700.47
Fiftieth fiscal year	7,309.42		16,396.58		10,258.39	15,051.74
Convicts' earnings		859.38				
Support United States prisoners		804.75				
Territorial purposes, forty-seventh fiscal year		1,600.76		$1,600.76		
Territorial purposes, fiftieth fiscal year		76,349.87	1,600.76	75,283.77		2,666.86
Sheep sanitary fund	666.09	811.37			1,400.00	77.46
Cattle indemnity fund	866.65	5,696.28			2,892.38	3,672.55
Capitol rebuilding fund	9,034.71				12,354.04	57,473.17
Proceeds 60 bonds		60,792.50				
Territorial institutions, forty-seventh fiscal year		468.70		468.70		
Territorial institutions, fiftieth fiscal year		21,980.14	468.70	21,645.88		802.96
Capitol contingent sinking fund	16,584.16	5,330.49				21,914.65
Special tax	4,911.65	13,452.06			14,861.82	3,501.89
Compilation fund	59.50	51.00				110.50
Salary fund	11,727.62	1,625.85	15,734.31		9,676.81	19,410.97
Supreme court fund	357.55		225.86		88.90	494.51
Special court fund	1,245.71					1,245.71
Total	72,475.18	246,900.82	98,999.11	98,999.11	124,049.81	195,326.19

RECAPITULATION.

Balances June 3, 1899	$72,475.18
Receipts during quarter	246,900.82
Total to be accounted for	319,376.00
Payments during quarter	124,049.81
Balances September 2, 1899	195,326.19

DISPOSITION OF FUNDS.

First National Bank of Santa Fe	$44,522.93
Bank of Commerce, Albuquerque	2,330.24
First National Bank of Las Vegas	29,937.11
First National Bank of Albuquerque	29,923.28
Taos County Bank	9,914.55
New Mexico Savings Bank and Trust Company	1,583.28
First National Bank of Raton	14,953.07
The Bank of Roswell	14,940.13
National Bank of Commerce of New York	17,260.60
San Miguel National Bank, Las Vegas	29,961.00
Total	195,326.19
Funds not available	1,583.28
Funds available	193,742.91
Deduct interest due	28,260.60
Free cash balance	165,482.31

Quarterly report of the auditor of public accounts of the Territory of New Mexico, giving a detailed statement of the receipts and expenditures during the fourth quarter of the forty-eighth fiscal year, ending March 5, 1898.

RECEIPTS.

Alejandro Sandoval, collector Bernalillo County	$19,106.28
C. W. Haynes, collector Chaves County	7,323.50
Hugh Smith, collector Colfax County	7,539.75
Jacob Schaublin, collector Donna Ana County	9,442.87
M. C. Stewart, collector Eddy County	4,784.66
John L. Burnsite, collector Grant County	13,148.66
Placido Baca y Baca, collector Guadaloupe County	1,355.24
Emil Fritz, collector Lincoln County	6,298.36
Frank A. Vigil, collector Mora County	2,703.04
W. G. Sargent, collector Rio Arriba County	2,540.15
John W. Brown, collector San Juan County	1,458.19
Fred Muller, collector Santa Fe County	5,365.85
Felix Martinez, collector San Miguel County	108.91
Tranquilino Labadie, collector San Miguel County	8,479.37
August Reingardt, collector Sierra County	4,959.84
M. Cooney, collector Socorro County	8,576.10
Silviano Lucero, collector Taos County	1,881.85
Emiterio Gallegos, collector Union County	1,877.73
Solomon Luna, collector Valencia County	3,433.70
E. H. Bergmann, superintendent New Mexico Penitentiary	2,397.30
C. H. Gildersleeve, clerk first judicial district	337.20
O. N. Marron, clerk second judicial district	468.65
H. P. Owen, clerk second judicial district	92.90
W. B. Walton, clerk third judicial district	210.15
Felix Martinez, clerk fourth judicial district	490.35
W. M. Driscoll, clerk fifth judicial district	626.99
J. A. La Rue, secretary cattle sanitary board	4,000.00
George H. Wallace, secretary of the Territory of New Mexico, corporation filing fees	769.00
J. B. Lamy, by order of the court	100.95
Blanche Boyle, by order of the court	19.50
Total	119,897.10

ABSTRACT OF RECEIPTS AND EXPENDITURES DURING THE QUARTER.

	Receipts	Expenditures.
Licenses	$60.1	$133 28
Penitentiary fund	2,397.30	8,030 73
Salary fund	2,226.24	7,918 05
Assessors fund	4,607.55	4,016 48
Miscellaneous		7,853.46
Transportation of convicts		357.67
Territorial institutions, viz:		
University of New Mexico		750.00
New Mexico Insane Asylum		9,475.82
New Mexico School of Mines		1,280.00
Agricultural college		2,148.07
Normal school, Silver City		1,338.86
Territorial purposes, forty-seventh fiscal year	1,998.67	
Territorial institutions, forty-seventh fiscal year	583.66	
Territorial purposes, forty-eighth fiscal year	6,110.67	
Territorial institutions, forty-eighth fiscal year	1,786.23	
Territorial purposes, forty-ninth fiscal year	60,200.60	
Territorial institutions, forty-ninth fiscal year	17,746.46	
Cattle indemnity	5,826.64	
School fund		28.34
Supreme court fund		58.80
Deficiency fund		22.48
Capitol rebuilding fund		3,371.29
Corporations fund	769.00	659.00
Capitol contingent sinking fund	4,479.90	
Special tax fund	10,517.78	
Sheep sanitary fu	586.23	
Total	119,897.10	47,442.93

Quarterly report of the auditor of public accounts of the Territory of New Mexico, giving a detailed statement of the receipts and expenditures during the first quarter of the forty-ninth fiscal year ending May 28, 1898.

RECEIPTS.

Alejandro Sandoval, collector Bernalillo County	$4,351.83
C. W. Haynes, collector Chaves County	606.65
Hugh Smith, collector Colfax County	4,435.29
Jacob Schaublin, collector Donna Ana County	1,361.69
M. C. Stewart, collector Eddy County	611.46
John L. Burnside, collector Grant County	2,749.36
Placido Baca y Baca, collector Guadaloupe County	247.26
Emil Fritz, collector Lincoln County	468.42
Frank A. Vigil, collector Mora County	646.45
W. G. Sargent, collector Rio Arriba County	109.68
John W. Brown, collector San Juan County	816.84
Fritz Muller, collector Santa Fe County	1,785.94
Tranquillino Labadie, collector San Miguel County	2,232.23
August Reingardt, collector Sierra County	558.15
M. Cooney, collector Socorro County	2,525.91
Silviano Lucero, collector Taos County	250.27
Emiterio Gallegos, collector Union County	1,207.24
Solomon Luna, collector Valencia County	213.88
C. H. Gildersleeve, clerk first judicial district, from January 1 to February 11, 1898	196.05
A. M. Bergere, clerk first judicial district, from February 12 to March 31, 1898	181.41
H. P. Owen, clerk second judicial district, for the quarter ending March 31, 1898	524.59
W. B. Walton, clerk third judicial district, for the quarter ending March 31, 1898	223.40
Felix Martinez, clerk fourth judicial district, for January and February 1898	228.20
Secundino Romero, clerk fourth judicial district, for the month of March, 1898	183.85
W. M. Driscoll, clerk fifth judicial district, for the quarter ending March 31, 1898	703.60
E. H. Bergmann, superintendent New Mexico penitentiary	1,901.49
Pullman Palace Car Company	91.97
J. A. La Rue, secretary cattle sanitary board	2,000.00
George H. Wallace, secretary of the Territory of New Mexico	1,021.00
Sale of compiled laws	161.50
Total	32,595.61

ABSTRACT OF RECEIPTS AND EXPENDITURES DURING THE QUARTER.

	Receipts.	Expenditures.
Licenses	$3.07	
Penitentiary fund	1,901.49	$6,517.05
Salary fund	2,241.10	8,282.45
Assessors' fund	1,046.35	1,528.52
Corporations' fund	1,021.00	569.35
Special tax fund	2,139.63	9,450.59
Capitol contingent sinking fund	856.72	
Sheep sanitary fund	284.10	
Territorial purposes, forty-seventh fiscal year	1,048.31	
Territorial institutions, forty-seventh fiscal year	305.47	
Territorial purposes, forty-eighth fiscal year	2,900.57	
Territorial institutions, forty-eighth fiscal year	846.21	
Territorial purposes, forty-ninth fiscal year	12,071.85	
Territorial institutions, forty-ninth fiscal year	3,564.75	
Cattle indemnity fund	2,223.49	
Compilation fund	161.50	
Miscellaneous fund		10,176.94
Transportation of convicts' fund		1,774.44
Supreme court fund		92.00
Capitol rebuilding fund		4,960.46

ABSTRACT OF RECEIPTS AND EXPENDITURES DURING THE QUARTER—continued.

	Receipts.	Expenditures.
Territorial institutions, viz:		
Agricultural college		$2,019.81
New Mexico Insane Asylum		3,509.52
New Mexico School of Mines		1,000.00
New Mexico Military Institute		2,400.00
University of New Mexico		3,000.00
Normal school, Las Vegas		2,383.06
Normal school, Silver City		1,044.20
Total	$32,595.61	58,668.39

Quarterly report of the auditor of public accounts of the Territory of New Mexico, giving a detailed statement of the receipts and expenditures during the second quarter of the forty-ninth fiscal year ending September 3, 1898.

RECEIPTS.

Alejandro Sandoval, collector Bernalillo County	$12,942.51
C. W. Haynes, collector Chaves County	8,339.15
C. C. Perry, ex-collector Chaves County	330.85
Hugh Smith, collector Colfax County	8,741.98
Jacob Schaublin, collector Donna Ana County	9,922.36
M. C. Stewart, collector Eddy County	3,535.12
John L. Burnside, collector Grant County	8,924.32
Placido Baca y Baca, collector Guadaloupe County	1,238.47
Emil Fritz, collector Lincoln County	5,348.91
Frank A. Vigil, collector Mora County	3,014.79
W. G. Sargent, collector Rio Arriba County	2,678.94
Martin Lopez, ex-collector Rio Arriba County	70.80
John W. Brown, collector San Juan County	576.16
Fred Muller, collector Santa Fe County	4,904.60
Tranquillino Labadie, collector San Miguel County	6,597.67
August Reingardt, collector Sierra County	3,708.48
M. Cooney, collector Socorro County	6,576.98
Silviano Lucero, collector Taos County	503.45
Emiterio Gallegos, collector Union County	1,886.95
Solomon Luna, collector Valencia County	2,959.05
A. M. Bergere, clerk first judicial district	215.40
Harry P. Owen, clerk second judicial district	453.60
J. P. Mitchell, clerk third judicial district	601.20
Secundino Romero, clerk fourth judicial district	218.05
W. M. Driscoll, clerk fifth judicial district	585.00
E. H. Bergmann, superintendent New Mexico penitentiary	1,410.80
J. A. La Rue, secretary cattle sanitary board	4,000.00
Geo. H. Wallace, secretary of the Territory of New Mexico	653.00
A. Staab, secretary capitol rebuilding board	69.58
Compilation fund (sale of compiled laws)	1,309.00
Product of note due First National Bank of Santa Fe to pay interest	12,500.00
Total	114,817.17

ABSTRACT OF RECEIPTS AND EXPENDITURES DURING THE QUARTER.

	Receipts.	Expenditures.
Licenses		$2.00
Penitentiary fund	$1,410.80	17,992.84
Salary fund	2,073.25	9,534.03
Assessors' fund	3,870.14	3,135.88
Corporations' fund	653.00	1.00
Special tax fund	9,542.19	1,399.99
Compilation fund (from sale of compiled laws)	1,309.00	1,000.00
Capitol rebuilding fund	69.58	13,625.71
Capitol contingent sinking fund	3,773.90	.....
Sheep sanitary fund	480.25	.....
Territorial purposes, forty-seventh fiscal year	1,135.87	.....
Territorial institutions, forty-seventh fiscal year	332.39	.....
Territorial purposes, forty-eighth fiscal year	2,464.78	.....
Territorial institutions, forty-eighth fiscal year	733.43	.....
Territorial purposes, forty-ninth fiscal year	53,422.15	.....
Territorial institutions, forty-ninth fiscal year	15,667.15	.....
Cattle idemnity fund	5,429.29	.....
Miscellaneous fund	.....	15,415.76
Transportation of convicts' fund	.....	1,440.16
Supreme court fund	.....	153.00
Territorial institutions fund, viz:		
Agricultural college	.....	479.40
New Mexico Insane Asylum	.....	5,258.85
New Mexico School of Mines	.....	1,850.00
University of New Mexico	.....	790.00
Normal School, Las Vegas	.....	479.40
Normal School, Silver City	.....	479.40
Due First National Bank of Santa Fe	12,500.00	.....
Total	114,817.17	73,037.42

Quarterly report of the auditor of public accounts of the Territory of New Mexico, giving a detailed statement of the receipts and expenditures during the third quarter of the forty-ninth fiscal year, ending December 3, 1898.

RECEIPTS.

Alejandro Sandoval, collector Bernalillo County	$3,588.28
C. W. Haynes, collector Chaves County	1,712.88
Hugh Smith, collector Colfax County	1,249.27
Jacob Schaublin, collector Donna Ana County	638.96
M. C. Stewart, collector Eddy County	1,934.09
John L. Burnsite, collector Grant County	1,549.31
Placido Baca y Baca, collector Guadaloupe County	212.35
Emil Fritz, collector Lincoln County	515.90
George Sena, ex-collector Lincoln County	356.45
Frank A. Vigil, collector Mora County	145.53
John W. Brown, collector San Juan County	617.65
Fred Muller, collector Santa Fe County	1,041.36
Tranquilino Labadie, collector San Miguel County	1,887.80
August Reingardt, collector Sierra County	445.38
M. Cooney, collector Socorro County	2,426.67
Silviano Lucero, collector Taos County	791.68
Emiterio Gallegos, collector Union County	801.77
Solomon Luna, collector Valencia County	159.91
Frank Kropp, treasurer Donna Ana County	266.07
James Goode, deputy treasurer Union County	3,662.88
A. M. Bergere, clerk first judicial district	189.75
Harry P. Owen, clerk second judicial district	391.95
James P. Mitchell, clerk third judicial district	278.95
Secundino Romero, clerk fourth judicial district	188.70
John E. Griffith, clerk fifth judicial district	230.85
E. H. Bergmann, superintendent New Mexico Penitentiary	1,749.72
J. A. La Rue, secretary cattle sanitary board	2,000.00
George H. Wallace, secretary of the Territory	76.00
Sale of compiled laws, 1897	408.00
Product of note due the First National Bank of Albuquerque to pay interest	15,000.00
Product of note due First National Bank of Santa Fe to pay interest	500.00
Total	45,018.11

ABSTRACT OF RECEIPTS AND EXPENDITURES DURING THE QUARTER.

	Receipts.	Expenditures.
Licenses	$9.20	
Penitentiary current expense fund	1,749.72	$7,497.43
Salary fund	1,280.20	9,645.41
Assessors fund	835.30	1,177.52
Special tax fund	2,204.66	10,985.61
Legal expense fund		227.75
Compilation fund (from sale of compiled laws)	408.00	836.00
Capitol rebuilding fund		12,410.85
Capitol contingent sinking fund	898.25	
Sheep sanitary fund	218.14	
Interest on deposits fund		122.60
Territorial purposes, forty-seventh fiscal year	962.69	
Territorial institutions, forty-seventh fiscal year	280.62	
Territorial purposes, forty-eighth fiscal year	1,785.82	
Territorial institutions, forty-eighth fiscal year	520.88	
Territorial purposes, forty-ninth fiscal year	10,983.62	
Territorial institutions, forty-ninth fiscal year	3,196.35	
Territorial purposes, fiftieth fiscal year	1,477.72	
Territorial institutions, fiftieth fiscal year	436.17	
Cattle indemnity fund	2,270.77	
Miscellaneous fund		8,239.19
Transportation of convicts fund		493.74
Supreme court fund		312.95
Territorial institutions fund, viz:		
University of New Mexico		2,400.00
Agricultural college		1,650.31
New Mexico Insane Asylum		2,347.41
New Mexico Military Institute		2,100.00
Normal school, Silver City		1,650.31
Normal school, Las Vegas		1,650.31
Due First National Bank of Albuquerque	15,000.00	
Due First National Bank of Santa Fe	500.00	
Total	45,018.11	63,747.39

Quarterly report of the auditor of public accounts of the Territory of New Mexico, giving a detailed statement of the receipts and expenditures during the fourth quarter of the forty-ninth fiscal year, ending March 4, 1899.

RECEIPTS.

Alejandro Sandoval, collector Bernalillo County	$5,080.80
J. L. Perea, treasurer and collector Bernalillo County	9,561.57
C. W. Haynes, collector Chaves County	4,121.25
J. A. Gilmore, treasurer and collector Chaves County	1,741.15
Hugh Smith, treasurer and collector Colfax County	11,778.65
A. E. Burnam, treasurer and collector Colfax County	706.17
Jacob Schaublin, collector Donna Ana County	7,918.95
M. C. Stewart, collector Eddy County	4,084.40
J. F. Matheson, treasurer and collector Eddy County	1,966.69
John L. Burnsite, treasurer and collector Grant County	17,037.04
Placido Baca y Baca, collector Guadaloupe County	86.74
Salome Martinez, treasurer and collector Guadaloupe County	969.68
Emil Fritz, collector Lincoln County	4,893.77
R. Michaels, treasurer and collector Lincoln County	649.04
Frank A. Vigil, collector Mora County	5,016.22
J. B. Martinez, treasurer and collector Mora County	335.51
W. G. Sargent, treasurer and collector Rio Arriba County	2,515.22
John W. Brown, collector San Juan County	672.80
Fred Muller, treasurer and collector Santa Fe County	5,438.51
Tranquilino Labadie, collector San Miguel County	636.15
Margarito Romero, treasurer and collector San Miguel County	6,053.01
August Reingardt, collector Sierra County	4,163.51
Will M. Robins, treasurer and collector Sierra County	4,617.08
M. Cooney, collector Socorro County	8,675.23
Abran Abeytia, treasurer and collector Socorro County	435.63
Silviano Lucero, collector Taos County	1,480.80
Donaciano Cordova, treasurer and collector Taos County	427.73
Emiterio Gallegos, collector Union County	1,993.88
Nepomuseno Martinez, treasurer and collector Union County	1,580.84

Solomon Luna, treasurer and collector Valencia County	$2,835.59
Luis M. Ortiz, ex-collector Rio Arriba County, taxes, 1888	84.70
J. A. La Rue, secretary cattle sanitary board	4,500.00
George H. Wallace, secretary Territory of New Mexico	283.00
E. H. Bergmann, superintendent New Mexico Penitentiary	1,051.21
A. M. Bergere, clerk first judicial district	223.60
Harry P. Owen, clerk second judicial district	442.80
James P. Mitchell, clerk third judicial district	425.80
Secundino Romero, clerk fourth judicial district	187.45
John E. Griffith, clerk fifth judicial district	392.05
Sale of compiled laws	263.50
Total	125,327.72

ABSTRACT OF RECEIPTS AND EXPENDITURES DURING THE QUARTER.

	Receipts.	Payments.
Licenses	$88.49	$75.00
Penitentiary current expense fund	1,051.21	7,175.83
Salary fund	1,671.70	8,691.81
Assessors fund	4,902.15	3,914.49
Special tax fund	12,542.71	1,407.66
Compilation fund (from sale of compiled laws)	263.50	212.50
Capitol rebuilding fund		8,608.09
Capitol contingent sinking fund	5,014.55	
Sheep sanitary fund	640.51	332.47
Interest on deposits fund		3,570.29
Territorial purposes, forty-seventh fiscal year	934.07	
Territorial institutions, forty-seventh fiscal year	271.87	
Territorial purposes, forty-eighth fiscal year	1,573.76	
Territorial institutions, forty-eighth fiscal year	459.83	
Territorial purposes, forty-ninth fiscal year	6,723.02	
Territorial institutions, forty-ninth fiscal year	1,918.55	
Territorial purposes, fiftieth fiscal year	60,766.92	6,695.05
Territorial institutions, fiftieth fiscal year	18,741.46	
Cattle indemnity fund	7,763.42	
Miscellaneous fund		6,930.38
Transportation of convicts fund		329.22
Supreme court fund		237.45
Territorial institutions fund:		
University of New Mexico		2,180.00
Agricultural college		1,379.05
New Mexico Insane Asylum		5,034.02
New Mexico School of Mines		1,750.00
New Mexico Military Institute		400.00
Normal school, Silver City		1,397.05
Normal school, Las Vegas		1,397.05
Total	125,327.72	61,667.41

NOTE.—The following appropriations made by the thirty-third legislative assembly were paid from the following funds, and the amounts are included on the column of expenditures above, to wit:

From interest on depoits for the payment of interpreters, translators, etc., as per C. J. R., No. 7	$2,957.75
From salary fund of the forty-sixth fiscal year	42.25
From Territorial purposes fund of the fiftieth fiscal year	1,000.00
From Territorial purposes, from pay of employees, translators, etc. (C. J. R., No 7	4,000.00
From Territorial purposes, fiftieth fiscal year, printing bills and in Spanish	1,695.05
Total	9,695.05

Quarterly report of the auditor of public accounts of the Territory of New Mexico, giving a detailed statement of the receipts and expenditures during the first quarter of the fiftieth fiscal year, ending June 5, 1899.

RECEIPTS.

J. L. Perea, treasurer and collector Bernalillo County	$2,106.16
C. W. Haynes, collector Chaves County	3,070.05
J. A. Gilmore, treasurer and collector Chaves County	1,019.60
A. E. Burnam, treasurer and collector Colfax County	4,688.88
Jacob Schaublin, treasurer and collector Donna Ana County	1,902.34
J. D. Walker, collector Eddy County	2.83
J. F. Matheson, treasurer and collector Eddy County	1,016.36
John L. Burnside, treasurer and collector Grant County	2,308.19

Placido Baca y Baca, collector Guadaloupe County	$864.26
Salome Martinez, treasurer and collector Guadaloupe County	357.04
R. Michaels, treasurer and collector Lincoln County	2,237.97
J. B. Martinez, treasurer and collector Mora County	227.58
W. G. Sargent, treasurer and collector Rio Arriba County	1,706.38
C. H. McHenry, treasurer and collector San Juan County	848.03
Fred Muller, treasurer and collector Santa Fe County	979.62
T. Labadie, collector San Miguel County	5,433.00
Margarito Romero, treasurer and collector San Miguel County	6,005.84
Will M. Robins, treasurer and collector Sierra County	471.73
Abran Abeytia, treasurer and collector Socorro County	858.90
Donaciano Cordova, treasurer and collector Taos County	408.89
Nepomuseno Martinez, treasurer and collector Union County	3,856.43
Solomon Luna, treasurer and collector Valencia County	134.00
E. H. Bergmann, superintendent New Mexico Penitentiary	1,250.31
A. M. Bergere, clerk first judicial district	169.95
H. P. Owen, clerk second judicial district	440.80
J. P. Mitchell, clerk third judicial district	212.00
Secundino Romero, clerk fourth judicial district	254.35
John E. Griffith, clerk fifth judicial district	203.85
Pullman Palace Car Company	71.05
George H. Wallace, secretary Territory, corporation fees	617.00
George H. Wallace, secretary Territory, unexpended balance (employees, 33d L. A)	80.00
Sale of Compiled Laws, 1897	68.00
Total	43,371.39

ABSTRACT OF RECEIPTS AND EXPENDITURES DURING THE QUARTER.

	Receipts.	Payments.
License fund		$23.76
Penitentiary current-expense fund	$1,250.31	11,969.52
Salary fund	1,280.95	2,051.24
Assessors' fund	1,662.89	2,695.39
Special-tax fund	3,806.30	12,854.25
Compilation fund (from sale of Compiled Laws)	68.00	102.00
Capitol contingent sinking fund	1,520.32	
Capitol rebuilding fund		9,642.48
Sheep sanitary fund	374.95	
Territorial purposes, forty-seventh fiscal year	553.04	
Territorial institutions, forty-seventh fiscal year	162.19	
Territorial purposes, forty-eighth fiscal year	561.01	352.71
Territorial institutions, forty-eighth fiscal year	163.71	
Territorial purposes, forty-ninth fiscal year	1,994.07	
Territorial institutions, forty-ninth fiscal year	453.19	
Territorial purposes, fiftieth fiscal year	22,857.65	5,988.70
Territorial institutions, fiftieth fiscal year	5,790.16	
Cattle indemnity fund	872.65	
Miscellaneous fund		8,449.34
Transportation of convicts fund		257.81
Supreme court fund		130.52
Territorial institutions fund, viz:		
University of New Mexico		1,750.00
Agricultural college		1,166.18
New Mexico Insane Asylum		4,247.71
New Mexico School of Mines		1,195.88
New Mexico Military Institute		2,100.00
Normal school, Silver City		1,166.18
Normal school, Las Vegas		1,166.18
Total	43,371.39	67,309.85

NOTE.—The following appropriations made by the thirty-third legislative assembly were paid from the following funds, and the amounts are included in the column of expenditures above, to wit:

For Territorial purposes, forty-eighth fiscal year, for printing report of superintendent of public instruction in Spanish, H. J. R. No. 4	$352.71
For Territorial purposes, fiftieth fiscal year, for printing bills, etc., in Spanish, C. B. No. 9	1,199.40
Expenses of committee visiting Territorial institutions, H. J. R. No. 13	125.50
Pay of interpreters, translators, etc., C. J. R. No. 11	3,000.00
Printing reports, etc., in Spanish, H. J. R. No. 4	1,413.80
Pay for muster in and out rolls, C. B. No. 100	250.00
Total	6,341.41

Quarterly report of the auditor of public accounts of the Territory of New Mexico, giving a detailed statement of the receipts and expenditures during the second quarter of the fiftieth fiscal year, ending September 5, 1899.

RECEIPTS.

J. L. Perea, treasurer and collector Bernalillo County	$16,242.86
J. A. Gilmore, treasurer and collector Chaves County	12,168.06
A. E. Burnam, treasurer and collector Colfax County	7,003.18
Jacob Schaublin, treasurer and collector Donna Ana County	9,819.99
J. F. Matheson, treasurer and collector Eddy County	6,870.72
John L. Burnside, treasurer and collector Grant County	20,132.71
Salome Martinez, treasurer and collector Guadaloupe County	1,850.09
R. Michaels, treasurer and collector Lincoln County	5,955.20
J. B. Martinez, treasurer and collector Mora County	2,582.17
W. G. Sargent, treasurer and collector Rio Arriba County	2,042.55
C. H. McHenry, treasurer and collector San Juan County	1,373.67
Fred Muller, treasurer and collector Santa Fe County	8,697.64
Margarito Romero, treasurer and collector San Miguel County	9,015.58
Wm. M. Robins, treasurer and collector Sierra County	1,684.88
Abran Abeytia, treasurer and collector Socorro County	8,582.91
Donaciano Cordova, treasurer and collector Taos County	1,376.39
Nepomuseno Martinez, treasurer and collector Union County	8,171.81
Solomon Luna, treasurer and collector Valencia County	3,543.63
J. La Rue, secretary cattle sanitary board, fees	2,000.00
Geo. H. Wallace, secretary Territory, corporation fees	1,878.00
W. H. Whiteman, adjutant-general, refund interest fund	8.65
A. M. Bergere, clerk first judicial district, fees	192.85
Harry P. Owen, clerk second judicial district, fees	456.60
J. P. Mitchell, clerk third judicial district, fees	128.80
Secundino Romero, clerk fourth judicial district, fees	522.35
J. E. Griffith, clerk fifth judicial district, fees	325.25
H. O. Bursum, superintendent New Mexico Penitentiary	1,664.13
E. H. Bergmann, ex-superintendent New Mexico Penitentiary	768.97
Sale of Compiled Laws, 1897	51.00
Sale of capitol rebuilding bonds, second series	60,792.50
Sale of certificates of indebtedness, Series A	39,475.00
Product of note First National Bank of Santa Fe, to pay interest	11,000.00
Total	246,378.09

ABSTRACT OF RECEIPTS AND EXPENDITURES DURING THE QUARTER.

	Receipts.	Payments.
Penitentiary current-expense fund	$2,433.10	$11,415.23
Salary fund	1,625.85	9,676.81
Assessors' fund	5,300.32	3,323.01
Special-tax fund	13,452.06	14,900.42
Compilation fund (from sale of Compiled Laws)	51.00	
Capitol contingent sinking fund	5,330.49	
Capitol rebuilding fund	60,792.50	12,315.63
Sheep sanitary fund	811.37	1,400.00
Cattle indemnity fund	5,698.28	
Miscellaneous fund		13,103.56
Supreme court fund		88.90
Territorial purposes, forty-seventh fiscal year	1,600.76	
Territorial institutions, forty-seventh fiscal year	468.70	
Territorial purposes, fiftieth fiscal year	76,349.87	
Territorial institutions, fiftieth fiscal year	21,980.14	
Interest on deposits fund		134.75
Deficiency fund		10.00
Territorial institutions fund, viz:		
University of New Mexico		2,731.13
Agricultural college		640.90
New Mexico Insane Asylum		6,798.64
New Mexico School of Mines		640.90
New Mexico Military Institute		1,900.00
Normal institute, Silver City		640.90
Normal school, Las Vegas		1,811.63
Due First National Bank of Santa Fe	11,000.00	
Paid by W H Whiteman, adjutant-general	8.65	
Certificates of indebtedness sale	39,475.00	
Total	246,378.09	81,527.41

FINANCIAL STATEMENT OF BERNALILLO COUNTY.

Total bonded indebtedness of the county of Bernalillo up to and including June 30, 1899, amounts to $362,587.33, composed of the following items:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
	Years.		*Per cent.*	
Jan. 1, 1885	10-20	Funding bonds	6	$22,500.00
Jan. 1, 1886	10-30	Court-house building	7	78,000.00
July 1, 1889	10-30	Funding bonds	6	38,000.00
Do	10-30	Current expenses	6	40,000.00
Nov. 16, 1891	20-30	....do	6	7,000.00
July 1, 1892	20-30	Bridge building	6	30,000.00
Jan. 1, 1893	15-30	Current expenses	5.9	17,000.00
July 1, 1895	10-30	Funding bonds	6	64,900.00
Aug. 2, 1897	10-20	....do	6	50,100.00
		Total bonded indebtedness		347,500.00
Approved accounts unpaid to June 30, 1899				15,087.33
Total indebtedness to June 30, 1899				362,587.33
Total assessed value of real and personal property for the year 1898				5,719,261.00

FINANCIAL STATEMENT OF CHAVES COUNTY.

Total indebtedness of said county up to and including June 30, 1899, amounts to $50,000, composed of the following amounts, viz:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
	Years.		*Per cent.*	
Jan. 1, 1891	10-20	Court-house and jail	6	$30,000
Do	10-20	Lincoln County indebtedness	6	13,000
Do	15-30	Current expenses	6	7,000
		Total bonded debt		50,000
Total assessed valuation, real and personal, for year 1898				1,907,049

FINANCIAL STATEMENT OF COLFAX COUNTY.

Total indebtedness of said county up to and including June 30, 1899, amounts to $70,400, composed of the following items, viz:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
	Years.		*Per cent.*	
July 1, 1897	10-30	Current expenses	6	$7,000
July 1, 1895	20-30	Funding debt	6	23,900
Aug. 1, 1897	20-30	....do	6	18,500
July 1, 1898	20-30	Improvement bonds	6	16,000
		Total bonded debt		70,400
Total assessed value of real and personal property for the year 1898				2,818,050

FINANCIAL STATEMENT OF DONNA ANA COUNTY.

Total indebtedness of said county up to and including June 30, 1899, amounts to $98,188,84, composed of the following amounts, viz:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
	Years.		*Per cent.*	
Jan. 1, 1885	10-20	Funding bonds	6	$9,400.00
July 1, 1889	10-20	do	6	32,000.00
July 1, 1895	10-20	do	6	23,100.00
Aug. 2, 1897	10-20	do	6	7,621.15
July 1, 1889	10-20	Current-expense bonds	6	15,000.00
July 1, 1891	10-20	do	6	7,000.00
		Total bonded debt		94,121.15
Judgments against the county				3,324.91
Approved accounts				589.92
Warrants outstanding				152.86
Total indebtedness				98,188.84
Void indebtedness under section 302, Complied Laws, 1897				10,584.85
Total assessed valuation, real and personal, for year 1898				2,435,753.00

FINANCIAL STATEMENT OF EDDY COUNTY.

Total indebtedness of said county up to and including June 30, 1899, amounts to $74,079.39.

Bonded debt.

Date of issue.	Date of maturty.	For what purpose issued.	Rate of interest.	Amount.
			Per cent.	
Nov. 30, 1891	Feb. 6, 1921	County current expenses	6	$7,000.00
July 1, 1891	July 1, 1911	Court-house and jail	6	30,000.00
Jan. 1, 1892	Jan. 1, 1912	Lincoln County indebtedness	6	10,000.00
June 2, 1894	Jan. 6, 1924	Bridge bonds (county)	6	3,000.00
Aug. 2, 1897	July 1, 1917	Floating-indebtedness bonds under act thirty-second legislative assembly	6	24,079.39
		Total bonded debt		74,079.39
Total assessed valuation of real and personal property, less exemptions				1,724,282.00

FINANCIAL STATEMENT OF GRANT COUNTY.

Total indebtedness of said county up to and including June 30, 1899, amounting to $270,585.03, composed of the following amounts, viz:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
			Per cent.	
July 1, 1882	June 30, 1902	Funding indebtedness	6	$100.00
July 1, 1883	June 30, 1903	Railroad	7	57,000.00
July 1, 1885	June 30, 1905	Funding indebtedness	6	18,500.00
July 1, 1889	July 1, 1919	do	6	115,500.00
Do	do	Current expenses	6	27,000.00
		Total bonded debt		218,100.00
Approved accounts outstanding				15,824.51
Warrants outstanding				65.87
Judgments against county				18,016.65
Floating indebtedness				18,578.00
Total indebtedness				270,585.03
Total assessed valuation, real and personal, for year 1898				3,674,972.85

FINANCIAL STATEMENT OF GUADALOUPE COUNTY.

Total amount of indebtedness of said county up to and including June 30, 1899, amounts to $30,478.88, composed of the following items, viz:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
	Years.		*Per cent.*	
January 1, 1893	20-30	Court-house and jail	6	$25,000.00
August 2, 1897	10-20	Funding indebtedness of current expenses	6	2,822.16
		Total bonded indebtedness		27,822.16
Judgments against county				1,259.13
Approved accounts outstanding 1898				1,200.74
Approved accounts outstanding 1899				196.85
Total indebtedness				30,478.88
Total amount of assessed value of real and personal property for the year 1898				700,257.00

FINANCIAL STATEMENT OF LINCOLN COUNTY.

Total indebtedness of the county of Lincoln up to and including June 30, 1899, amounts to $57,715, composed of the following amounts, viz:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
	Years.		*Per cent.*	
October 3, 1892	20	Funding indebtedness	8	$3,000.00
January 1, 1883	20	do	8	500.00
June 2, 1883	20	do	8	300.00
April 7, 1885	30	do	6	2,600.00
July 1, 1889	15	do	6	24,366.00
July 1, 1894	20-30	Current expenses	6	7,000.00
August 2, 1897	20-30	Funding indebtedness	6	11,075.00
		Total bonded indebtedness		48,841.00
Approved accounts				4,379.32
Warrants outstanding				1,760.38
Account of George Sena				2,734.30
Total indebtedness				57,715.00
Total assessed valuation of real and personal property for the year 1898				1,608,226.00

FINANCIAL STATEMENT OF MORA COUNTY.

Total indebtedness of the county of Mora, up to and including June 30, 1899, amounts to $101,823.14, composed of the following items, viz:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
	Years		*Per cent.*	
August 1, 1889	10-20	Court-house and jail	6	$70,000.00
August 2, 1897	10-20	Funding bonds	6	7,693.75
		Total bonded indebtedness		77,693.75
Approved accounts outstanding				1,314.49
Judgments against county unpaid				9,315.44
Interest due and unpaid				13,499.46
Total indebtedness to June 30, 1899				101,823.14
Total assessed value of real and personal property for the year 1898				1,016,120.00

M'KINLEY COUNTY.

McKinley County was formed from a portion of the county of Bernalillo, by an act of the thirty-third legislative assembly of the Territory of New Mexico, which went into effect February 23, 1899.

The only indebtedness against the county at the date of June 30, 1899, was its portion or pro rata of the indebtedness of that (Bernalillo) county, and it is impossible to determine what the pro rata of indebtedness will be until the assessment of this county has been completed.

This county of McKinley will be organized in 1900.

OTERO COUNTY.

Otero County was formed from portions of Donna Ana, Socorro, and Lincoln counties, by an act of the thirty-third legislative assembly of the Territory of New Mexico, which went into effect February 1, 1899.

The only indebtedness against the county at date of June 30, 1899, was its portion or pro rata of the indebtedness of those counties, and it is impossible to determine what the pro rata of indebtedness will be until the assessment of this county has been completed.

FINANCIAL STATEMENT OF RIO ARRIBA COUNTY.

Total indebtedness of the county of Rio Arriba, up to and including June 30, 1899, amounts to $51,902.60, composed of the following items, viz:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
	Years		*Per cent.*	
July 5, 1882	20-30	Funding bonds, current expenses of court-house, jail, and bridges	6	$45,749.00
		Total bonded indebtedness		45,749.00
Approved accounts outstanding				5,015.80
Warrants outstanding				1,137.80
Total indebtedness to June 30, 1899				51,902.60
Total assessed value of real and personal property for the year 1898				1,053,179.00

FINANCIAL STATEMENT OF SAN JUAN COUNTY.

Total indebtedness of said county up to and including June 30, 1899, amounting to $21,290.16, composed of the following amounts, viz:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest	Amount.
			Per cent.	
December 30, 1889	Dec. 30, 1919	Current expense	6	$8,000.00
September 1, 1892	Sept. 1, 1922	Jail bonds	6	2,500.00
January 1, 1893	Jan. 1, 1923	Current expense	6	4,000.00
October 1, 1892	Oct. 1, 1922	Judgment	6	2,600.00
April 1, 1894	Apr. 1, 1923	Current expense	6	3,000.00
		Total bonded debt		20,100.00
Warrants outstanding				180.05
Floating indebtedness				1,010.11
Total indebtedness				21,290.16
Total assessed valuation, real and personal, for year 1898				873,258.00

FINANCIAL STATEMENT OF SAN MIGUEL COUNTY.

Total indebtedness of San Miguel County, up to and including June 30, 1899, amounts to $496,886, composed of the following items, viz:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
	Years.		*Per cent.*	
July 1, 1882	10	Refunding	8	$3,300
July 1, 1884	10	Court-house and jail	6	26,500
July 1, 1889	10-30	Funded debt, 1889	6	213,300
Jan. 1, 1892	30	Court-house and jail bonds, 1892	6	18,000
Nov. 1, 1895	20-30	Funded debt, 1895	5½	113,300
July 1, 1897	10-20	Funded debt, 1897	6	13,879
		Total bonded indebtedness		388,279
Approved accounts outstanding, including floating debt				10,000
Judgments against county				23,107
Past due interest unpaid				75,500
Total indebtedness				496,886
Total assessed value of real and personal property for the year 1898				4,440,364

FINANCIAL STATEMENT OF SANTA FE COUNTY.

Total indebtedness of the county of Santa Fe, up to and including June 30, 1899, amounts to $874,256.42, composed of the following items, viz:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
	Years.		*Per cent.*	
July 1, 1882	10-20	Current expense	8	$14,600.00
Jan. 1, 1885	20-30	....do	6	27,000.00
Jan. 10, 1890	20-30	....do	6	6,300.00
Sept. 29, 1891	20-30	Railroad bonds	5	262,000.00
Aug. 1, 1891	20-30	Current expense	5	19,500.00
Mar. 1, 1892	20-30	Railroad bonds	5	178,600.00
Do	20-30	Court-house and jail	5	64,500.00
Do	20-30	Current expense	5	90,900.00
Jan. 1, 1893	20-30	....do	5	3,500.00
Aug. 1, 1897	10-20	....do	6	13,139.00
		Total bonded indebtedness		680,039.00
Outstanding warrants				2,790.00
Accounts filed and approved and certificates issued				2,850.00
Accounts due and approved				421.00
Past due interest unpaid				188,156.42
Total indebtedness to June 30, 1899				874,256.42
Total assessed value of real and personal property for the year 1898				1,768,150.66

FINANCIAL STATEMENT OF SIERRA COUNTY.

Total indebtedness of the county of Sierra, up to and including June 30, 1899, amounts to $68,623, composed of the following items:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
	Years.		*Per cent.*	
July 1, 1889	15-30	Funding bonds	6	$56,800
Do	15-30	Current expense	6	10,000
		Total bonded indebtedness		66,800
Approved accounts unpaid to June 30, 1899				1,823
Total indebtedness to June 30, 1899				68,623
Total assessed value of real and personal property for the year 1898				1,344,495

FINANCIAL STATEMENT OF SOCORRO COUNTY.

Total indebtedness of the county of Socorro, up to and including June 30, 1899, amounts to $180,335.66, composed of the following items, viz:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
	Years.		*Per cent.*	
Jan. 1, 1884	10-20	Court-house and jail and funding debt	6	$103,500.00
July 1, 1889	10-20	Bridges and improvement	6	54,700.00
July 1, 1897	10-20	Funding bonds	6	20,700.00
		Total bonded indebtedness		178,900.00
Approved accounts outstanding				1,435.66
Total indebtedness to June 30, 1899				180,335.66
Total assessed value of real and personal property for the year 1898				4,611,482.00

FINANCIAL STATEMENT OF TAOS COUNTY.

Total indebtedness of the county of Taos, up to and including June 30, 1899, amounts to $44,900, composed of the following items:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest	Amount.
	Years.		*Per cent.*	
June 6, 1889	10-30	Funding bonds	6	$24,500
July 2, 1889	10-30	Current expense	6	3,000
July 1, 1892	15-30	....do	6	3,500
Aug. 2, 1897	10-20	Funding bonds	6	10,400
		Total bonded indebtedness		41,400
Approved accounts outstanding to June 30, 1899				3,500
Total indebtedness to June 30, 1899				44,900
Total assessed value of real and personal property for the year 1898				611,816

FINANCIAL STATEMENT OF UNION COUNTY.

Total indebtedness of the county of Union, up to and including June 30, 1899, amounts to $36 631.67, composed of the following items:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
	Years.		*Per cent.*	
Nov. 1, 1894	10-20	Court-house and jail	6	$20,000.00
Jan. 15, 1895	15-30	Current expense	6	7,000.00
		Total bonded indebtedness		27,000.00
Judgments against county				3,068.67
Interest due and unpaid				1,563.00
Outstanding indebtedness				5,000.00
Total indebtedness to June 30, 1899				36,631.67
Total assessed value of real and personal property for the year 1898				1,631,500.00

FINANCIAL STATEMENT OF VALENCIA COUNTY.

Total indebtedness of the county of Valencia, up to and including June 30, 1899, amounts to $106,982, composed of the following items:

Bonded debt.

Date of issue.	Date of maturity.	For what purpose issued.	Rate of interest.	Amount.
	Years.		*Per cent.*	
Jan. 1, 1882	10-20	Floating debt	8	$18,982.00
Jan. 1, 1885	10-20	....do	6	3,800.00
Jan. 1, 1889	10-20	....do	6	18,700.00
Aug. 1, 1889	10-20	Current expense	6	30,000.00
Jan. 1, 1891	10-20	....do	6	7,000.00
Jan. 1, 1895	10-20	Floating debt	6	20,000.00
Jan. 1, 1897	10-20	....do	6	8,500.00
		Total bonded indebtedness		106,982.00
The above comprises the total indebtedness to June 30, 1899.				
Total assessed value of real and personal property for the year 1898				2,186,509.26

RECAPITULATION.

County.	Assessed value.	Indebtedness.
Bernalillo	$5,719,261.00	$362,587.33
Chaves	1,907,049.00	50,000.00
Colfax	2,818,050.00	70,400.00
Donna Ana	2,435,753.00	98,188.84
Eddy	1,724,282.00	74,079.39
Grant	3,674,972.85	270,585.03
Guadalupe	700,257.00	30,478.88
Lincoln	1,606,226.00	57,715.00
Mora	1,016,120.00	101,823.14
McKinley[1]		
Otero[1]		
Rio Arriba	1,053,179.00	51,902.60
San Juan	873,258.00	21,290.16
San Miguel	4,440,364.00	496,886.00
Santa Fe	1,768,150.68	874,256.42
Sierra	1,344,495.00	68,623.00
Socorro	4,611,482.00	180,335.66
Taos	611,816.00	44,900.00
Union	1,631,500.00	36,631.67
Valencia	2,186,509.26	106,982.00
Total	40,124,724.79	2,997,665.12

[1] McKinley and Otero counties were created by the last legislature and are included in the counties from which they were formed in the assessment and debt of 1898 and until June 30, 1899.

BANKS.

The statements of the different banks throughout the Territory of New Mexico show the following business for the fiscal year ending June 30, 1899:

First National Bank of Albuquerque	$2,080,450.04
First National Bank of Las Vegas	684,931.49
First National Bank of Santa Fe	632,731.79
First National Bank of Raton	243,543.73
San Miguel National Bank, Las Vegas	661,210.31
Las Vegas Savings Bank, Las Vegas	104,340.59
Silver City National Bank, Silver City	314,173.31
Bank of Commerce, Albuquerque	561,425.55
Sierra County Bank of Hillsboro	108,353.65
Bank of Roswell, Roswell	305,789.87
Bank of Deming, Deming	162,028.33
Exchange Bank of White Oaks	97,802.14
George D. Bowman & Sons, Las Cruces	63,837.93
Andrew Morton & Co., Springer	56,149.60
Taos County Bank, Taos	94,587.28

INTERNAL-REVENUE SERVICE, DISTRICT OF NEW MEXICO,
Santa Fe, N. Mex., July 20, 1899.

DEAR SIR: In response to your letter of the 13th instant, I have the honor to submit herewith a statement of the collections for the Territory of New Mexico, for the fiscal year ended June 30, 1899, from the various sources enumerated below, viz:

Assessed taxes, fines, penalties, and interest	$7,201.42
Beer stamps	7,352.22
Spirit stamps	1,121.34
Cigar and cigarette stamps	1,305.08
Tobacco stamps	89.00
Playing-card stamps	1.72
Special-tax stamps	20,978.94
Adhesive stamps	28,882.28
Total	66,932.00

Very respectfully,

A. L. MORRISON,
Collector Internal Revenue.

Hon. M. A. OTERO,
Santa Fe, N. Mex.

DISTRICT COURTS AND SOLICITOR-GENERAL,
LAS VEGAS, N. MEX., *August 31, 1899.*

SIR: I beg to acknowledge receipt of your letter of recent date, in which you ask me to report at some length on the condition of the counties comprising the fourth judicial district of this Territory, over the courts of which I have the honor to preside, in order that you may insert the same in the annual report which you make to the honorable Secretary of the Interior.

I regret that I have not the time to make as full a report as I would like to do as to the physical condition of the several counties, and their capability for development, but it would in any event hardly be necessary, as the compilations published in your last report set them out quite fully. I will, however, briefly refer to some matters connected with the judiciary of the Territory, confining myself more particularly to this district, and may then touch very slightly on some of the changes which have occurred in the counties comprising my district, during the past year.

The courts of this Territory are different from any in the States, inasmuch as they have jurisdiction over both Federal and Territorial cases. The entire Territory is divided into five judicial districts, the judge for each district being

appointed by the President and confirmed by the Senate. In each of these districts two terms of the United States court are held annually for the trial of Federal cases, and in each county of the five districts two terms of the Territorial district court, for the trial of causes arising under the laws of the Territory, are provided by law. All of these terms are presided over by the several district judges.

The supreme court of the Territory consists of the five district judges, who meet annually at Santa Fe for the purpose of hearing such matters as are properly brought before them. From this court appeals lie to the United States circuit court of appeals, and to the Supreme Court of the United States, which is the court of last resort.

From the above it will be seen that the number of terms of court which a judge holds annually depends on the number of counties which are in his district, and the length of each term depends on the business to be done and the funds on hand in the county treasury to pay the court expenses.

The fourth judicial district consists of five counties, and the average terms of court as follows:

	Weeks.
Supreme court, about	7
United States court, about	4
San Miguel County, about	12
Colfax County, about	6
Guadalupe County, about	2
Mora County, about	4
Union County, about	3
Total weeks per year	38

In addition to this a large number of cases, which do not require the intervention of a jury, motions, orders, etc., are heard in chambers, out of court, so that the time of a judge in this Territory is fully occupied.

Our laws provide that each county shall levy a special tax for the carrying on of the Territorial courts, which tax, when collected, is paid into what is known as the court fund. As the amount collected in the several years varies, in the past the Territorial district courts have been held somewhat irregularly; but I believe that the finances of the several counties have so far improved that in the future these courts will be held at the regular terms—that is, twice each year in each county except in the county of Guadaloupe, where there is only money and business enough to warrant the holding of one term annually.

The county seats of each of the counties in the district, save Guadaloupe and Mora, are on the line of the railroad and are quite easily reached, although when holding a term of court in Clayton, the county seat of Union County, a railroad journey of 262 miles is necessary. To reach Puerto de Luna, the county seat of Guadaloupe County, requires an overland ride of some 80 miles, while to reach Mora, the county seat of Mora County, a 32-mile ride overland is necessary.

Acting as the supreme court, we have been kept much occupied. On our first assembling we found a very large docket confronting us for hearing—if I remember rightly, something over 60 cases. All of these have been heard, and decisions have been handed down in all of them but about a dozen opinions, and these will be handed down at a later day, so that when the supreme court convenes at its regular January term, 1900, there will be an entirely new docket to consider. I believe that I can say with safety that our course in insisting that all of the cases on the docket be heard meets with the general approbation of both the bar and the persons who are interested in the results.

It is perhaps unnecessary for me to say that the hearing of these cases imposed much arduous labor on us, but every member of the court cheerfully assumed the duties assigned to him.

It is needless for me to go into a detailed statement of the number of Territorial cases pending and disposed of in the district court of the several counties in my district, as the statement prepared by the efficient clerk of my court, Mr. Secundino Romero, which is published herewith, gives this information, and I refer you to it. Suffice it to say that crime is swiftly and surely punished in all of the counties in the district, and the knowledge that such is the case has had a deterrent effect on those contemplating wrongdoing. Anyone who has civil cases pending can get a speedy trial if he so desires. On the whole, I can say that the courts in my district are running in a very satisfactory manner, and so far as I know give general satisfaction to all law-abiding citizens. It shall be my aim so long as I have the honor to preside over the courts of the fourth judicial district of this

Territory to so conduct them that the several terms may be regularly held and justice meted out with an even hand.

During the past year but few crimes of a heinous nature have been committed. In the entire district there have been but two or three murders committed, which is a most excellent record for a country so extensive as this and so sparsely settled, especially when we consider that so many people are engaged in nomadic pursuits. The larger part of the indictments returned into court for serious offenses were for the larceny of cattle, horses, and sheep. I am glad to say that the example made of such of these defendants as have been tried has kept others from repeating their offenses. The speedy punishment of this class of crimes is particularly necessary in a country like this, where the stock-raising interests are so large.

Union County, in my district, has had two "train robberies" during the year both occurring within a mile or two of each other, near the town of Folsom, on what is now known as the Colorado Southern Railroad. It is claimed that the first of these robberies was made by three men, one of whom died of wounds inflicted during a pursuit, another is under arrest, and only one of the party is at large. The last robbery was made by one man, who was wounded and is now in the penitentiary awaiting trial. The breaking up of these bands of outlaws will, I think, put an end to such robberies for some time to come. The alleged robbers were not residents of this Territory, but came in from the outside.

During the year I held the first term of court at the new court-house at Raton, the county seat of Colfax County. The court-house is pleasantly arranged, well cared for, and is an ornament to the city. It is a real pleasure to preside over a court where the surroundings are so agreeable. Raton being centrally located according to the population of Colfax County, court can be carried on at much less expense than at any other point in the county.

The people who reside in my district were never so well off in a material way as at the present moment. There is more money in the Territory than ever before, and it loans at much lower rates of interest to those who are of known responsibility than ever before. The rise in cattle, wool, and sheep, in which so many of our people are interested, has placed a large amount of money in circulation, and every mercantile and banking business feels the good times which are upon us. That the tariff be not changed materially for years to come is the wish of nine-tenths of our people, and if such wish is realized, in a few years the people of this district will be loaning to the Eastern money centers. In fact, it is almost impossible to realize the changed condition of our people during the last three years.

Respectfully yours,

WILLIAM J. MILLS, *Chief Justice, etc.*

Hon. MIGUEL A. OTERO,
Governor of New Mexico, Santa Fe, N. Mex.

REPORT OF THE SOLICITOR-GENERAL.

I have the honor to herewith submit my report of the doings of this office since I took possession of the same on the 7th of March, 1898.

During that time I have given 30 written opinions to different Territorial officers, at their request, upon various subjects.

I have appeared for and defended 4 suits in mandamus against the auditor in the district courts of the Territory, 1 of which I appealed to the supreme court of the Territory, where it is now pending; and on behalf of the Territory I have instituted 2 suits in the district court for Santa Fe County against the county commissioners of San Miguel County, one for the purpose of recovering from them and their bondsmen $30,000 due to the Territory from taxes alleged to have been illegally abated by that board, and the other to recover the penalty of $100 provided by law and the expenses of a special messenger to receive the election returns of that county, which the board failed to forward as provided by law.

In the supreme court, at the last term, I prepared and filed briefs in 12 cases, 4 of them civil, to recover taxes, 2 of which were argued and submitted and 2 are pending.

Of the 8 criminal cases appealed by convicted defendants, 2 were for murder, 2 for rape, 2 for larceny of animals, 1 for arson, and 1 for perjury. Of these cases 2 were reversed, 1 was affirmed, 2 have been argued and submitted, and 3 are to be argued at the adjourned term of the supreme court.

NEW COMPILATION OF THE LAWS.

The compilation of the laws under the act of 1897 is generally very accurate and satisfactory, the only serious omission which I have observed being in section 1702, "Registration," where there is omitted the last portion of section 1215, Compiled Laws of 1884, in regard to the disposition of the registration lists, requiring two copies to be sent to the probate clerk, he to retain one and forward the other to the secretary of the Territory. This is a very important omission, and, while it is still the law, it should be made to appear in its proper place by inserting it at the end of section 1702.

In section 1654 the old sections are compiled exactly as they appear in the compilation of 1884, but it should be amended so as to be more explicit and conform to the evident intent of the legislature and the translation. This section is in regard to the election returns in districts comprising more than one county, by which the election returns are required to be made to "the county first appointed." A very slight amendment will be sufficient to make the section clear and explicit.

Section 1646, in regard to persons voting in another precinct than that of their residence, is repealed by section 1709, requiring a certificate of the board of registration that the party so applying is duly registered.

The school law in regard to the election of school directors, section 1532, should be amended so as to compel the old boards of directors to call the election as provided by law, and their failure so to do should be punished by removal from office and a heavy fine, to go to the school district. The directors have been taking advantage of the laxity of the law to keep themselves in office indefinitely by failing to call the election, to the great detriment of the school. Also, there should be adequate provision made for the canvassing of the votes at this election and giving proper certificates of election.

Section 1524, providing for the payment to the superintendent of schools of each county of $5 a day, should be repealed, as a salary is provided for that officer by section 1771.

Sections 2730 to 2737, inclusive, providing for the attachment of the body of a debtor, should be specifically repealed, as they have been held by the district courts to be repealed by implication. They are obsolete and should not appear in our laws, as they are sometimes sought to be invoked and enforced in justice of the peace courts.

Section 36, in regard to "acequias," was decided by the supreme court on the 24th of August last, in the case of Levy *v.* Ortega, to have been repealed, and the legislature should formally repeal the section in conformity with that opinion.

Sections 1072 to 1078, relative to the crime of murder, are doubtless repealed by implication by the crimes act of 1891. Under these sections the crime of murder was divided into five degrees, while the act of 1891 limited them to three. These are the sections referred to by the solicitor-general in passing upon the correctness of the compilation, and should be repealed by the legislature in terms.

In regard to appeals to the supreme court in criminal cases there is a manifest conflict between sections 3409 and 3420, Compiled Laws of 1897, which works a great injustice. These sections should be reconciled by an act which might either repeal the latter part of section 3420 or by an entirely new section on the subject.

The matter of costs on appeal is something that should be fixed by definite law. At present, under sections 3413, 3414, Compiled Laws of 1897, any person convicted of any crime may take an appeal to the supreme court with practically no expense to himself, but involving considerable expense to the Territory and unnecessary labor on the prosecuting officer, besides being an injustice to the clerks of the court who receive no compensation for their work in preparing transcript. Such appeals, I know, in many instances to be without merit and taken simply for the purpose of delay.

Section 2570, providing that the solicitor-general need not reside at the capital, should be repealed. He, as well as other Territorial officers, should at all times be ready to attend to the public business by having their residence at the capital of the Territory.

The statutes providing for district attorneys bringing tax suits, found at sections 649 and 2576–2579, should be reconciled and harmonized.

Sections 4007 and 4078 should be changed so as to provide for printing to be given to the lowest responsible bidder.

Section 1803, being chapter 35, Laws of 1895, does not in terms provide for the sheriff's fees as provided for in sections 1256–1257, Compiled Laws of 1884, which were omitted from the compilation of 1897, and these old sections should either be specifically added or excluded from such new sections.

There should be a provision that a summons in garnishment or attachment should be answered within twenty days from the service, to make the procedure

uniform and expeditious, instead of having such answer returnable to a term of court.

Suits against Territorial officers should be brought in the court of the county wherein their offices are located; this would be no inconvenience to the plaintiff, while the public business might suffer and great inconvenience arise by requiring Territorial officers to go to distant parts of the Territory to defend suits against them.

The law should provide for a supersedeas bond on appeal to the supreme court in mandamus cases as in other civil actions.

Section 2935, providing the defendant shall answer within ten days after service in certain cases, is in conflict with section 19, subdivision 2 of the Code, which gives twenty days in which to answer, and should be amended so as to read "twenty days" instead of ten.

Section 928 should have inserted at the beginning of the section the words "the probate court shall have exclusive original jurisdiction in all of the following cases, to wit," as contained in the original act, section 48, chapter 90, page 221, Laws of 1889, which were omitted by the compilers through mistake. These words are very important, in fact indispensable for the proper construction of said section.

The Code of Civil Procedure, in my opinion, has given general satisfaction to the bench, bar, and litigants, and while some amendments may be necessary the Territory is to be congratulated upon the results obtained by its adoption.

Very respectfully,

EDWARD L. BARTLETT,
Solicitor-General.

SIR: In compliance with your request for information regarding the business of the supreme court of the Territory of New Mexico, I have the honor to respectfully submit the folling statement:

SUPREME COURT.

At the beginning of the present fiscal year, there were the following number of cases undisposed of and pending in the supreme court, to wit:

Number of cases brought up by appeal	28
Number of cases brought up by writ of error	39
Total number of cases pending	67

Which were brought up from the following districts:

From the first judicial district court—	
By appeal	0
By writ of error	8
From the second judicial district court—	
By appeal	13
By writ of error	13
From the third judicial district court—	
By appeal	1
By writ of error	5
From the fourth judicial district court—	
By appeal	4
By writ of error	2
om the fifth judicial district court—	
By appeal	11
By writ of error	10
Total number of cases	67

Of which the following is the standing and disposition:

Finally determined by affirmance of judgment	24
Finally determined by dismissal	3
Finally determined by reversal of judgment with instructions to grant a new trial in lower court	9
Finally determined by reversal of judgment with instructions to lower court to dismiss	3
Under advisement by the court	22
Continued to next regular term	3
To be heard at adjourned session, August 23, 1899	3
Total number of cases	67

During the year there have been filed in my office sixteen applications for admission to the supreme court bar, the status of which is as follows:

Number of applicants admitted by supreme court	13
Number of applicants awaiting examination by committee	3
Total	16

Of the cases which have been finally determined by affirmance of judgment, four have been taken to the Supreme Court of the United States by writ of error, one has been taken by writ of error to the United States circuit court of appeals, and one has been granted a new hearing in this court, and will be heard at the adjourned session of August 28, 1899, and two are pending upon the motion for a rehearing in this court.

During the year there have been brought into this court the following number of new cases, all of which are returnable to the next regular term of the court:

Number of cases brought up by appeal	2
Number of cases brought up by writ of error	8
Total number of new cases	10

Brought into the court as follows:

From the first judicial district court—	
By appeal	1
By writ of error	1
From the second judicial district court—	
By writ of error	4
From the fifth judicial district court—	
By writ of error	4
Total number of new cases	10

At the time that I took charge of the affairs of this office, nearly one year ago, the files in this office were in a very disorderly and lamentable condition, but after two months and a half of constant and hard work I have succeeded in arranging the files in a proper and accessible manner. Every case which had been finally determined, from No. 1 to the present time, has been separately indexed, each index stating the papers contained in the particular case, and wrapped up in strong manila paper, and the number of the case marked on the outside of the bundle. In a good many instances, owing to the careless manner in which the files had been kept, papers of great importance are missing, in several cases no papers at all having been found by me.

The supreme court has not held a regular session during the year 1899, owing to the fact that the last legislative assembly changed the time of its meeting, and the court entered an order fixing the times of the United States courts in accordance and conformity with the act of the legislative assembly, and the following is a correct calendar of the times and places of the meeting of the United States and Territorial courts:

The supreme court meets in Santa Fe on the first Wednesday after the first Monday in January, 1900, and annually thereafter.

TERMS OF THE DISTRICT COURTS.

First district.—In Santa Fe, United States court, first Mondays in March and September. Santa Fe County, first Mondays in March and September. San Juan County, third Mondays in April and October. Rio Arriba County, second Mondays in May and November. Taos County, first Mondays in June and December.

Second district.—In Albuquerque, United States court, third Mondays in March and September. Bernalillo County, third Mondays in March and September. Valencia County, first Mondays in March and September.

Third district.—In Lascruces, United States court, first Mondays in April and October. Donna Ana County, first Mondays in April and October. Grant County, first Mondays in March and September. Otero County, first Mondays in May and November. Sierra County, fourth Mondays in May and November.

Fourth district.—In Las Vegas, United States court, second Mondays in May and November. San Miguel County, second Mondays in May and November. Union County, first Mondays in March and September. Colfax County, third Mondays in March and September. Mora County, fourth Mondays in June and December. Guadaloupe County, fourth Mondays in June and December.

Fifth district.—In Socorro, United States court, last Monday in April and second Monday in November. Socorro County, fourth Monday in April and second Monday in November. Eddy County, fourth Monday in February and second Monday in September. Lincoln County, first Monday in April and third Monday in October. Chaves County, second Monday in March and fourth Monday in September.

The next regular session of the supreme court will begin on the 3d day of January, 1900. The supreme court has fixed the first day of the term for the examination of all the applicants for admission to the bar, and has a standing committee for that purpose. Rules of the supreme and district courts, in pamphlet form, a supply of which is always on hand in this office, will be furnished to anyone who applies for the same, free of charge.

THE BAR ASSOCIATION.

The New Mexico Bar Association is a corporation organized under the laws of the Territory of New Mexico, its main object being the cultivation of the science of jurisprudence; to promote reform in the law; to elevate the standard of integrity, honesty, and courtesy in the legal profession; to facilitate the administration of justice; to encourage a thorough and liberal education, and to cherish a spirit of brotherhood among the members thereof.

The officers of the organization are a president, five vice-presidents, a secretary, and a treasurer, together with the usual number of standing committees. Its present membership is about 125, 15 of whom are nonresidents.

The following have been its presidents since the time of its organization: William A. Vincent, Las Vegas, 1886; Neil B. Field, Albuquerque, 1887; S. B. Newcomb, Las Cruces, 1888; Frank Springer, Las Vegas, 1889; F. W. Clancy, Santa Fe, 1890; William C. Hazledine, Albuquerque, 1891; A. B. Elliot, Hillsboro, 1892; A. A. Jones, Las Vegas, 1893; J. G. Fitch, Socorro, 1894; T. B. Catron, Santa Fe, 1895; Neil B. Field, Albuquerque, 1896: A. B. Fall, Las Cruces, 1897; R. E. Twitchell, Las Vegas, 1898.

The following are its present officers and standing committees: President, R. E. Twitchell, Las Vegas; vice-president, first district, E. A. Fiske, Santa Fe; vice-president, second district, E. W. Dobson, Albuquerque; vice-president, third district, T. F. Conway, Silver City; vice-president, fourth district, W. C. Wrigley, Raton; vice-president, fifth district, A. A. Freeman, Eddy; secretary, E. L. Bartlett, Santa Fe; treasurer, G. W. Knaebel, Santa Fe.

Delegates to American Bar Association: Frank Springer, N. C. Collier, W. B. Childers.

Delegates to National Bar Association: T. B. Catron, E. W. Dobson, N. B. Field.

Executive committee: The president, the secretary, ex officio, F. W. Clancy, W. H. Pope, A. C. Campbell.

Legal education: H. L. Warren, W. A. Hawkins, R. C. Gortner, L. C. Fort, R. W. D. Bryan, S. B. Gillett.

Grievances: T. B. Catron, B. M. Read, J. Leahy, G. A. Richardson, W. B. Childers.

Admission: O. N. Marron, C. A. Spiess, A. B. Elliott, S. Alexander, B. F. Adams.

Revision of constitution and by-laws: A. A. Jones, J. G. Fitch, T. A. Finical, S. Alexander, E. L. Medler.

Legal biography: S. B. Newcomb, E. V. Chavez, A. V. McMillen, A. L. Morrison, C. W. Johnston.

History of bench and bar: R. E. Twitchell, William Breeden, L. B. Prince.

Law reform: B. S. Rodey, H. B. Ferguson, H. L. Warren, N. B. Laughlin, E. F. Conway.

The following quotation from the last report of the secretary of the association, I believe, will give better information as to the doings and status of the association.

"At this time I deem it not amiss to call the attention of the members, as well as that of other associations to whom these minutes shall come, to the fact, which is little known, that we are among the very first of the State or Territorial bar associations to be organized west of the Mississippi River. Of the thirty-eight State and Territorial bar associations in the United States, nineteen were organized before ours and seventeen after. I have been unable to get the date of the organization of the associations in Kentucky and Mississippi, although I have written to the secretaries for the same. Our work, while done quietly, has been valuable and far-reaching, not only for the profession, but for the advantage of the people in the Territory generally. The money which we have contributed has been expended for necessary printing; the purchase of rare and valuable books, and flowers for our dead, amounting to about $2,500, and we have on hand

about $400. There has only been $250 expended for services and expenses of officers since the organization of the association, and $200 expended for banquets. A brief résumé of the work of the association may be interesting.

"It was organized at Santa Fe, January 19, 1886. The constitution and by-laws adopted were based upon those of Illinois and Missouri. They have been amended at various sessions since to meet changed conditions.

"Hon. William A. Vincent, who shortly afterwards was chief justice of the Territory, was the first president. He has since removed to Chicago, where he is now practicing his profession.

"At the session of 1887, a strong memorial was addressed to Congress, urging the passage of an act for the settlement of land-grant titles in the Territory; also a memorial to the Territorial legislature, recommending the passage of various laws to conform to modern usage and practice. Several of these laws recommended by the association were enacted by the legislature. The report was prepared by John H. Knaebel, and is a most instructive and interesting document. At the session of 1888, the president, Mr. Field, called the attention of the association to the gross abuses practiced by district attorneys and clerks of the court in the matter of their fees, and the enormous expense entailed on the Territory thereby; upon which the association took such prompt action that the flagrant abuses complained of were promptly corrected at the following session of the legislature. At this session delegates were first elected to the American Bar Association, and we have continued to elect delegates ever since. At the session of 1889, this association became a member of the National Bar Association and elected delegates thereto. It prepared and recommended for passage a number of important bills, all of which were enacted into laws by the legislature, among them the act correcting the 'omissions, inconsistencies, and contradictions' in the Compiled Laws of 1884. The act relating to probate law, administration, and wills, the assignment law, the act prescribing form of acknowledgment to deeds, as recommended by the National Bar Association, and a number of others of less importance. The committee on the history of bench and bar was created at this session, the reports of which have been an unique and interesting feature of the meetings since. At the session of 1890, the then president, Mr. Springer, in his address, again called the attention of the association to the necessity of Congressional action in the settlement of private land grants. The association took hold of this matter with such vigor that its memorial to Congress on the subject was acted upon by that body in the following year, by creating a Court of Private Land Claims, embodying in the act most of the recommendations of the association. It also memorialized Congress for the creation of the Fifth judicial district, which was shortly after done. At the session of 1891, in his address to the association, the president, Mr. Clancy, used the following language:

"'Before concluding, I must congratulate you upon what the association has succeeded in accomplishing during its brief existence. It is but five years since our first organization and yet as direct results of our exertions, abuses of their official powers by public prosecutors have been suppressed, robbery of the public treasury by our courts' officials has been stopped, beneficial legislation has been secured on the subject of wills and descents, negotiable paper, acknowledgments of deeds, justices of the peace and constables, assignments, pleading, evidence, and others, including the passage of acts to remedy numerous inconsistencies and contradictions in our statutes.

"'At this session bills were prepared and recommended which were enacted into laws by the legislature providing for the summer session of the supreme court, redistricting the Territory for judicial purposes and fixing the time for holding courts in the several counties, relative to judgment liens, the law fixing return days, and relative to appeals and writ of error, and the crime law defining murder and other felonies and taking away the powers of juries to fix punishments.'

"In 1892, the association prepared amendments to the act creating the Court of Private Land Claims and an elaborate argument in favor of them, and appointed a committee to present and urge the same upon Congress. It also prepared, printed, and paid for the rules of the Court of Private Land Claims, these rules being adopted by it and now in force.

"At the session of 1893, the association was incorporated under the Territorial laws.

"A complete set of rules for the supreme court and district courts in law and equity was carefully prepared and submitted to the supreme court then in session, which adopted and promulgated the same. The association paid the expense of proper indexing of the same and assumed to pay for the printing of it should it be necessary, but it afterwards discovered that this expense could be and was paid by the Territory.

"At the session of 1894, the matter of a code for the Territory was thoroughly discussed, and the first steps were taken in the direction of a code by appointing a committee of five to prepare and present to the next meeting a code of civil practice.

"At the session of 1895 this committee reported a proposed code, which was discussed for several days and nights, section by section, amended, changed, and finally adopted by a vote of 31 ayes and 15 noes, and recommended to the legislature, then in session, for passage. This bill passed the council at that session, but failed in the house.

"At the session of 1896, the matter of a revision of the laws, which had not been compiled since 1884, occupied the attention of the association, a special committee on revision consisting of ten members, being the five members of the committee on law reform and five other members, one from each judicial district, was appointed for the purpose of preparing a complete revision of the existing laws, and performed a great deal of work in that direction. At the present session of 1897 it was reported that the code, which had failed at the previous session of the legislature, had been passed as recommended by the association, and went into effect on the 1st day of August of this year. The legislature also passed a law providing for the recompilation of the laws of the Territory, appointing a commission for that purpose, so that the committee on revision decided that it had no more work to perform and its labors were not continued.

"By the request of the supreme court, the association prepared a new set of rules for the supreme and district courts, to conform with the practice under the new code, and the association embodied in them a new rule for the admission of applicants to practice law, based upon the laws of Illinois and Ohio on that subject, and being similar to the bill prepared by the association at its session of 1893. These rules were adopted and promulgated by the courts as recommended by the association on the 1st day of September, 1897.

"It is a noteworthy fact that none of the laws recommended by the association have been repealed or altered by the legislature, and that all of them have stood the test of investigation by the courts.

"Such is a brief summary of the actual results accomplished by the association, while the amount of work involved to bring them about has been enormous, and I believe that we may congratulate ourselves upon our accomplishments as compared with that of any other similar association in the United States. It will be seen from the above that there has not been a single meeting without earnest work for the public good and tangible results accomplished."

The annual meeting of the association occurs at the time of the regular session of the supreme court of the Territory, and its next meeting will be held in January. The supreme court at its next regular session will meet on the 3d of January, 1900, and no doubt the session will be held in its beautiful and commodious rooms in the new capitol building, which is now nearing completion.

Trusting that this information in regard to the supreme court of the Territory and the New Mexico Bar Association will be satisfactory, and awaiting your further commands, I remain,

Yours, most respectfully,

JOSÉ D. SENA,
Clerk of the Supreme Court.

Hon. MIGUEL A. OTERO,
Governor of New Mexico, Santa Fe, N. Mex.

Report of business transacted in the first judicial district court of the Territory of New Mexico from July 1, 1898, to June 30, 1899.

UNITED STATES.

CIVIL.

Pending June 30, 1898	8
Disposed of by dismissal and judgment	4
Pending June 30, 1899	4

CRIMINAL.

Pending June 30, 1898	14
New causes	7
Disposed of by dismissal	3
Disposed of by trial	10
Pending June 30, 1899	8

TERRITORIAL.

TAOS COUNTY.

Pending June 30, 1898	22
New causes instituted	24
Disposed of by dismissal	3
Disposed of by trial	13
Pending June 30, 1899	30

CRIMINAL.

Pending June 30, 1898	21
Pending June 30, 1899	21

SAN JUAN COUNTY.

CIVIL.

Pending June 30, 1898	15
New causes instituted	27
Disposed of by dismissal	5
Disposed of by trial and judgment	21
Pending June 30, 1899	16

CRIMINAL.

Pending June 30, 1898	6
New causes instituted	6
Diposed of by trial	1
Pending June 30, 1899	11

RIO ARRIBA COUNTY.

CIVIL.

Pending June 30, 1898	28
New causes instituted	3
Disposed of by dismissal	1
Disposed of by trial	1
Pending June 30, 1899	29

CRIMINAL.

Pending June 30, 1898	19
New causes instituted	
Disposed of by dismissal or trial	
Pending June 30, 1899	19

SANTA FE COUNTY.

CIVIL.

Pending June 30, 1898	189
New causes instituted	100
Disposed of by dismissal	77
Disposed of by trial and judgment	55
Pending June 30, 1899	157

CRIMINAL.

Pending June 30, 1898	38
New causes instituted	40
Disposed of by dismissal	38
Disposed of by trial	13
Pending June 30, 1899	27

RECAPITULATION.

CIVIL.

Causes pending June 30, 1898:	
United States	8
Taos County	22
San Juan County	15
Rio Arriba County	28
Santa Fe County	189
Total	262

Causes filed since June 30, 1898:	
United States	
Taos County	24
San Juan County	27
Rio Arriba County	8
Santa Fe County	100
Total	154
Causes tried and dismissed:	
United States	4
Taos County	16
San Juan County	26
Rio Arriba County	2
Santa Fe County	132
Total	180
Causes pending June 30, 1899:	
United States	4
Taos County	30
San Juan County	16
Rio Arriba County	29
Santa Fe County	157
Total	236

CRIMINAL.

Causes pending June 30, 1898:	
United States	14
Taos County	21
San Juan County	6
Rio Arriba County	19
Santa Fe County	38
Total	98
Causes filed since June 30, 1898:	
United States	7
San Juan County	6
Santa Fe County	40
Total	53
Causes tried and dismissed:	
United States	13
San Juan County	1
Santa Fe County	51
Total	65
Causes pending June 30, 1899:	
United States	8
Taos County	21
San Juan County	11
Rio Arriba County	19
Santa Fe County	27
Total	86

DISTRICT COURT, VALENCIA COUNTY.

Criminal cases pending on docket June 30, 1898		22
Criminal cases instituted during year ending June 30, 1899		7
Total		29
Disposed of:		
Convictions	1	
Dismissals	10	
		11
Balance cases pending June 30, 1899		18
Civil actions pending June 30, 1898		44
Civil actions filed during year ending June 30, 1899		28
Total		72
Disposed of:		
Tried	19	
Dismissed	11	
		30
Balance cases pending June 30, 1899		42

DISTRICT COURT, BERNALILLO COUNTY.

Criminal cases pending on docket June 30, 1898		72
Criminal cases instituted during year ending June 30, 1899		64
Total		136
Disposed of:		
Convictions	33	
Acquittals	5	
Dismissals	12	
		50
Balance cases pending June 30, 1899		86
Civil actions pending June 30, 1898		289
Civil actions filed during year ending June 30, 1899		251
Total		540
Disposed of:		
Tried	255	
Dismissed	71	
		326
Balance cases pending June 30, 1899		214

DISTRICT COURT, SECOND JUDICIAL DISTRICT.

Criminal cases pending June 30, 1898		4
Cases instituted during year ending June 30, 1899		6
Total		10
Disposed of:		
Convictions	4	
Dismissals	4	
		8
Balance cases pending June 30, 1899		2
Civil causes pending June 30, 1898:		
Chancery		2
Law		9
Total		11

Civil causes instituted during year ending June 30, 1899:		
Bankruptcy—		
Voluntary	9	
Involuntary	1	
Other actions	2	
		12
Total		28
Disposed of, tried, etc		7
Balance causes pending June 30, 1899		16

LAS CRUCES, N. MEX., *July 31, 1899.*

SIR: Responding to your favor of 1st instant, asking for a report of the transactions of this office for the fiscal year ending June 30, 1899, I have the honor of handing same to you herewith, sincerely trusting it may prove satisfactory.

I beg to remain, yours, most respectfully,

JAMES P. MITCHELL, *Clerk.*

Hon. MIGUEL A. OTERO,
Governor of New Mexico, Santa Fe, N. Mex.

Report of the transactions of the office of the third judicial district court for the fiscal year ending June 30, A. D. 1899.

United States civil cases pending July 1, 1898	None.
United States civil cases filed from July 1, 1898, to June 30, 1899	2
Balance of United States civil cases pending July 1, 1899	2
United States criminal cases pending July 1, 1898	10
United States criminal cases filed from July 1, 1898, to June 30, 1899	13
	23
Disposed of	16
Balance criminal cases pending July 1, 1899	7

DONNA ANA COUNTY.

Civil cases pending July 1, 1898	20
Civil cases filed from July 1, 1898, to June 30, 1899	64
	84
Disposed of	53
Balance civil cases pending July 1, 1899	31
Chancery cases pending July 1, 1898	10
New cases	None.
	10
Disposed of	4
Balance pending July 1, 1899	6
Criminal cases pending July 1, 1898	33
Criminal cases filed from July 1, 1898, to June 30, 1899	65
	98
Disposed of	64
Balance pending July 1, 1899	34

Criminal cases docketed during period July 30, 1898, to June 30, 1899, in Grant County, N. Mex., 113—4179 to 4291, inclusive.

Cases disposed of July 30, 1888, to June 30, 1899, including cases docketed prior to July 30, 1898, as follows:

Nolle—4175, 4179, 4182, 4183, 4184, 4185, 4186, 4187, 4188, 4190, 4192, 4237, 4240, 4250, 4265, 4270, 4279, 4280, 4286, 4287.

Acquittals—4191, 4254, 4275, 4277.

Change of venue—4196.

No bills—4195, 4197, 4198, 4258, 4261, 4262, 4263, 4264.

Convictions—these include penitentiary and jail sentence, fines for violating statutory laws, etc.: 4181, 4189, 4194, 4200, 4204, 4205, 4206, 4207, 4208, 4210, 4211, 4212, 4213, 4214, 4215, 4216, 4217, 4218, 4219, 4220, 4221, 4222, 4223, 4224, 4225, 4226, 4227, 4228, 4229, 4230, 4231, 4232, 4233, 4234, 4235, 4236, 4238, 4239, 4243, 4244, 4245, 4246, 4247, 4248, 4249, 4260, 4268, 4269, 4271, 4273, 4274, 4281, 4288.

Dropped with leave: 4156, 4174, 4178.

Dismissed at defendant's costs: 4201, 4241, 4272, 4283.

Dismissed at plaintiff's costs: 4176, 4177, 4290, 4291.

Total number of cases pending June 30, 1899: 32.

Civil and chancery cases docketed during period July 30, 1898, to June 30, 1899, Grant County, N. Mex., 77—3411 to 3487, inclusive.

Cases disposed of July 30, 1898, to June 30, 1899, including cases docketed prior to July 30, 1898, as follows:

Judgment for plaintiff—2745, 2894, 3466, 3454, 3465, 3361, 3410, 3421, 3426, 3417, 3470, 3430, 3151, 3429, 3437, 2871, 2992, 3362, 3419, 3423, 3428, 3424, 3446, 3410.

Judgment for defendant: 3431, 3442.

Final decree—2646, 2647, 3405, 3414, 3415, 3435, 3436, 3441, 3443, 3456.

Insanity committee appointed—3427, 3433.

Insanity, defendant discharged—3479.

Dismissed—2915, 2989, 3122, 3174, 3197, 3323, 3268, 3269, 3271, 3272, 3273, 3274.

Dismissed at plaintiff's costs—3026, 3170, 3304, 3352, 3393, 3395, 3396, 3409, 3412, 3413, 3179, 3416, 3438, 3448, 3451, 3459, 3462, 3463.

Dismissed at defendant's costs—3312, 3477, 3478.

Dismissed, costs divided—3394.

Total number of cases pending June 30, 1899—chancery, 19; civil, 63.

SIERRA COUNTY.

Civil cases pending July 1, 1898	4
Civil cases filed from July 1, 1898, to June 30, 1899	11
	15
Disposed of	10
Balance pending July 1, 1899	5
Chancery cases pending July 1, 1898	5
New cases filed	None.
	5
Disposed of	3
Balance pending July 1, 1899	2
Criminal cases pending July 1, 1898	13
Criminal cases filed from July 1, 1898, to June 30, 1899	34
	47
Disposed of	8
Balance pending July 1, 1899	39

OTERO COUNTY.

Civil cases pending July 1, 1898	None.
Civil cases filed from July 1, 1898, to June 30, 1899	1
	1
Disposed of	None.
Balance pending July 1, 1899	1

Causes pending in the fourth judicial district on June 30, 1898, and new cases brought up to June 30, 1899, and disposition of same to June 30, 1899:

UNITED STATES.

CIVIL.

Pending June 30, 1898	2
Disposed of	1
Pending June 30, 1899	1

CRIMINAL.

Pending June 30, 1898	12
New cases	15
	27
Disposed of	19
Pending June 30, 1899	8

SAN MIGUEL COUNTY.

CIVIL.

Pending June 30, 1898	341
New cases	104
	445
Disposed of	79
Pending June 30, 1899	366

CRIMINAL.

Pending June 30, 1898	132
New cases	52
	184
Disposed of	87
Pending June 30, 1899	97

COLFAX COUNTY.

CIVIL.

Pending June 30, 1898	110
New cases	79
	189
Disposed of	48
Pending June 30, 1899	141

CRIMINAL.

Pending June 30, 1898	66
New cases	65
	131
Disposed of	47
Pending June 30, 1899	84

MORA COUNTY.

CIVIL.

Pending June 30, 1898	78
New cases	26
	104
Disposed of	21
Pending June 30, 1899	83

CRIMINAL.

Pending June 30, 1898	36
New cases	22
	58
Disposed of	30
Pending June 30, 1899	28

UNION COUNTY.

CIVIL.

Pending June 30, 1898	31
New cases	32
	63
Disposed of	26
Pending June 30, 1899	37

CRIMINAL.

Pending June 30, 1898	35
New cases	18
	53
Disposed of	27
Pending June 30, 1899	26

GUADALUPE COUNTY.

CIVIL.

Pending June 30, 1898	20
New cases	8
	28
Disposed of	6
Pending June 30, 1899	22

CRIMINAL.

Pending June 30, 1898	29
New cases	24
	53
Disposed of	21
Pending June 30, 1899	32

DEAR SIR: In compliance with your request of recent date, I beg to submit the following report of the business of this office for the year ending June 30, 1899:

TERRITORIAL CIVIL CASES.

Pending July 1, 1898	304
Filed during year	134
Total	438
Disposed of during year	195
Pending July 1, 1899	243

TERRITORIAL CRIMINAL CASES.

Pending July 1, 1898	97
Filed during year	71
Total	168
Disposed of during year	73
Pending July 1, 1899	95

UNITED STATES CIVIL CASES.

Pending July 1, 1898	4
Filed during year	7
Total	11
Disposed of during year	4
Pending July 1, 1899	7

UNITED STATES CRIMINAL CASES.

Pending July 1, 1898	6
Filed during year	2
Total	8
Disposed of during year	4
Pending July 1, 1899	4
Total cases pending July 1, 1898	411
Total cases filed during year	214
Grand total	625
Total cases disposed of during year	276
Total cases pending July 1, 1899	349

Respectfully,

J. E. GRIFFITH, *Clerk.*

Governor M. A. OTERO,
Santa Fe, N. Mex.

OFFICE OF THE ADJUTANT-GENERAL,
Santa Fe, N. Mex., July 1, 1899.

SIR: I have the honor to make my report of the condition of the National Guard of New Mexico at the close of the fiscal year ended June 30, 1899. Since the date of my last report the volunteers from New Mexico in the First United States Volunteer Cavalry and in the First Territorial United States Volunteer Infantry have been mustered out of the Volunteer Army and returned to their homes and quietly settled down to their former business pursuits, having served their country faithfully and won distinction and honor in every situation wherever placed, and received from their countrymen the grateful applause due to their valor.

The several organizations of the National Guard were much depleted by volunteer enlistments and some of them almost wholly disorganized. The work of reorganization has proceeded slowly. Many of the volunteers returned in poor health, with their systems filled with fevers contracted in Cuba, and have not felt like taking up National Guard work; but they are now manifesting more interest, and in a short time the Guard will be stronger and more effective in every way than before the war.

The official roster of the National Guard is as follows, viz:

Commander-in-chief, Miguel A. Otero; adjutant-general, William H. Whiteman; judge-advocate-general, Col. Ralph E. Twitchell; surgeon-general, Col. W. R. Tipton; aides-de-camp, Col. E. Godwin-Austen, Col. Harry Whigham, Col. E. W. Dobson, Col. Venceslado Jaramillo, Col. J. J. Frey, Col. J. E. Hurley, Maj. James G. Meadors, Maj. R. S. Goss.

First regiment of infantry: Colonel, John Borrodaile; lieutenant-colonel,

Robert C. Rankin; surgeon, Maj. John F. Pearce; chaplain, Capt. Frederick J. Bennett; adjutant, Lieut. E. L. Medler; quartermaster, Lieut. Louis H. Chamberlin; sergeant-major, Boston E. Barnhill; quartermaster-sergeant, E. B. Booth; hospital steward, Clarence R. Helper.

First battalion: Major, vacant; assistant surgeon, Capt. H. M. Smith; chaplain, Capt. George Selby; adjutant, Lieut. B. F. Forsythe; quartermaster, Lieut. H. W. Kelly.

Company I: Captain, Hanford W. Taylor; first lieutenant, Herman C. Ilfeld; second lieutenant, Royal Prentice.

Second battalion: Major, vacant; adjutant, vacant; quartermaster, vacant; chaplain, Capt. Paul Silberton.

Company B: Disorganized.

Company G: Captain, Charles E. Burg; first lieutenant, James E. Elder; second lieutenant, Frank H. Strong.

Third battalion: Major, Eugene Van Patten; adjutant, Lieut. John Francis Findlay; quartermaster, Lieut. Phœbus Frudenthal; assistant surgeon, Capt. John McConnell; chaplain, Capt. Pedro Lasaign; sergeant-major, James Finley, quartermaster-sergeant, Henry Rynerson; ordnance sergeant, Mariel Valdez; color-sergeant, Juan Pedragon; hospital steward, Precillano Moreno.

Company A: Captain, Pedro Pedragon; first lieutenant, Cesario Pedragon; second lieutenant, Margarito Padilla.

Company B: Captain, Clinton B. Llewellyn; first lieutenant, Humboldt Casad; second lieutenant, Francisco Ribera.

Company D: Captain, Gregario Garcia; first lieutenant, Solomon C. Garcia; second lieutenant, vacant.

First squadron of cavalry: Major, Frederick Muller; surgeon, Maj. J. H. Sloan; adjutant, Sherard Coleman.

Troop A: Captain, Willard S. Hopewell; first lieutenant, J. B. McPherson; second lieutenant, Peter Crumrine.

Troops C, E, and F were disorganized by enlistments in the volunteer service. Troop E is being reorganized, and this popular organization will soon again take its proper place in the National Guard.

GATLING-GUN SQUAD.

The Gatling-gun squad was also disorganized by enlistment in the volunteer service and by the death of its commanding officer, First Lieut. F. W. Wientge, who died soon after his muster out of the Volunteer Army. The squad is now being reorganized, and within the next thirty days will again take its place in the National Guard.

SIGNAL CORPS.

The signal corps was disorganized by enlistments in the volunteer service, but it is hoped that in a short time reorganization will be perfected. This corps was commanded by Capt. W. C. Reid, who commanded Company F in the First Territorial United States Volunteers and is still in the National Guard service.

Pursuant to Special Orders, No. 4, dated Santa Fe, May 4, 1899, I left Santa Fe on the 4th day of May, and proceeded to Roswell, N. Mex., where I arrived on the 6th day of May, for the purpose of inspecting the New Mexico Military Institute, situated at that place, as directed by said order.

The inspection was made on the 8th day of May, 1899, and was as thorough in every respect as the same could be made. The notice to the superintendent of the intended inspection was received by him on the same day of my arrival at Roswell, so that there was but little time for preparation, and the conditions I found must necessarily have been the ordinary or normal condition of the institution. I inspected every room in the building, beginning with the dormitories. I found the bedsteads used were of cast iron, made for one person, each room being occupied by two students. I tumbled the bedding off and closely examined the mattresses and bedding, and found same fresh and clean and free of vermin. The floors and walls of the building throughout showed most cleanly care. Especial attention was given to an examination of the closets and the drainage therefrom. I found that a sewer pipe had been extended from the school building in a southeast direction to the river, affording perfect drainage from the closets and bathrooms. The plumbing seemed to be in perfect order, and I was unable to detect any bad odors in or about the closets or about the entire building.

I made a close examination of the groceries and provisions found on hand, and in every instance found the quality excellent and free of adulteration. I dined at the institution, and was served with the same kind of food that was given the students.

I found the food plentiful, well cooked, well seasoned, and, in fact, just such a dinner as may be found in the homes of people of middle life all over the country.

I witnessed an exhibition drill of the cadets, both in company and battalion formation, and was greatly pleased with their movements, which showed excellent instruction and discipline. I made a careful inspection of the cadets, of their arms, accoutrements, and uniforms, and found all in good condition. The arms furnished by the Territory are kept in a room in the basement set apart for that purpose, and appear to receive good care. I found 65 cadets present for duty and they appeared very proficient in the most recent system of tactics, and even the smallest cadets were familiar with modern tactics, the manual of arms, and the advanced bayonet exercises especially adapted to the Krag-Jörgenson rifle.

The college building is a handsome, substantial structure of brick, containing three stories and a basement, situated about one-half mile north of the business center of Roswell. The grounds extend over 40 acres of land overlooking the town. The situation is a beautiful and healthy one. The building contains 30 nice, airy, wholesome bedrooms, besides class rooms, office, kitchen, dining room, pantry, laundry, bathroom, and closets. The furnishings are comfortable and substantial. The recitation rooms are equipped with excellent twentieth century chair desks, which are said to be the most comfortable now in use. The building is heated by steam throughout from a large boiler in the basement, and there is a good supply of hot and cold water on every floor. The building is lighted by an excellent acetylene plant located about 100 feet away. The water supply is furnished from a tank of 10,000 gallons capacity, which is kept filled by means of a steam pump.

An examination of the course of study reveals the practical nature of the school. Four years of preparatory work are required, so that any student can enter who knows how to read, write, spell, and apply the fundamental rules of arithmetic. The preparatory course is followed by four years of collegiate work. The studies are such as are usually found in institutions of like character. The text-books in use in the preparatory course are those adopted for use in the Territorial public schools. In addition, there is taught the art of war, theoretical tactics, the manual of arms, and in fact everything usually taught in high-class military schools. Especial attention is paid to proper gymnastic exercises, and to reasonable and healthful athletic sports necessary to the physical, mental, and moral good of the students.

There are employed in the institute a superintendent, commandant of cadets, three instructors, matron, engineer, two cooks, janitor, and laundryman, at a cost of $6,000 per annum. The superintendent, Maj. James G. Meadors, is a graduate of Washington and Lee University of Virginia, and is a gentleman of fine culture, full of energy and zeal, devoted to the institution, ambitious to succeed, and, if properly supported, will make the institute so successful that every citizen of New Mexico may well be proud of it. The success already attained, the progress made in a single year, is highly creditable to the superintendent and to his able assistants, as well as to the people of Roswell, who take great and commendable pride in the institution. Mr. J. W. Willson, commandant, a graduate of the Virginia Military Institute, is an excellent man for the place. Of the other instructors, Mr. W. S. Fitzgerald, a graduate of Vanderbilt University, Mr. W. H. Whitten, graduate of Massachusetts Institute of Technology, Mr. L. Martini-Mancini, graduate of military school of Italy, ex-lieutenant of cavalry, I saw but little. They are all gentlemen of fine appearance and address, are represented to be excellent instructors, and give to the superintendent a hearty and loyal support. Mrs. Meadors, the matron, is an excellent, kind-hearted lady, who gives her whole time and care to the institution, takes great pride in the success of her husband's administration, and contributes very materially to such success.

The only commissioned officer in the institute is the superintendent, who holds a commission as major and aid-de-camp on the staff of the governor. I am of the opinion that proper rank in the superintendent, commandant, and instructors is absolutely essential to the maintenance of authority and respect in an institution of this character. The failure to make provision by law for giving rank to these officers is the result of an oversight of the legislative assembly, which will certainly be rectified when called to its attention; in view of which I respectfully recommend that temporary commissions be issued to the superintendent, commandant of cadets, and instructors, subject to the action of the legislative assembly at its next session, respectively, the superintendent to be colonel, the commandant to be major, and the instructors to be captains. I also regard it as indispensable that the next legislative assembly should make provision by law for commissions to be issued by the superintendent to captains and lieutenants of cadets, and for

the appointment of noncommissioned officers from the cadets, their appointment and tenure to be regulated by law, or under such rules and regulations as the board of regents may prescribe.

The institute is provided with 80 Springfield rifles, caliber .45, and their accoutrements. These were furnished some months ago under your order, although the institute was not entitled to them under any law in existence. They are simply regarded as a loan until such time as the necessities of the National Guard may require their return. In my opinion provision should be made by law for properly equipping the institute with arms. The Springfield rifle is not at all suited to the younger cadets, being entirely too heavy. They should be supplied with a piece of modern artillery, sabers, and other arms necessary to teach and illustrate the art of war.

The eminent success of the institute in this, the first year of its existence, gives great encouragement for the future. This hope, however, may be frustrated by a failure to make prompt provision for its immediate necessities and for its expansion. Already the dormitories are filled to the limit of their capacity. There are 30 students in attendance who live or board in Roswell outside of the institute. I regard it as of the utmost importance and necessary to the success of the institute that all students should reside in the barracks. Those who live outside are liable to become lax in responding to the discipline of the school, while those who live inside will become envious of what seems to them the greater privileges enjoyed by those living outside. All students should be at all times under the eye and authority of the officers of the school. In matters of discipline there should be no divided authority between officers and parents.

There is an immediate demand for more commodious quarters. The institute should be provided at once with thirty more bedrooms, a room for a library, gymnasium, society halls, and storehouse. The laundry should be removed from the basement and placed in a separate building. I am aware that much of this can not be accomplished without legislative authority, but if there exists authority in the board of regents to provide for the more pressing needs of the institute by the construction of a temporary board structure, I should strongly recommend its exercise.

I desire to acknowledge my indebtedness to the officers of the institute and the people of Roswell for the many courtesies extended to me during my visit to the institute while in the performance of my duty.

I have the honor to be, etc., very respectfully, your obedient servant,

W. H. WHITEMAN,
Adjutant-General.

Hon. MIGUEL A. OTERO,
Governor of New Mexico.

NEW MEXICO'S WAR RECORD.

Since New Mexico became a part of the United States by the formation of her Territorial government, she has never failed to give a prompt response to the nation's call for soldiers. The loyalty and patriotism of the people of New Mexico can not be successfully questioned in view of her war record.

THE INDIAN WARS.

In the early history of the Territory the frequent Indian outbreaks were a source of great danger and distress in the West. New Mexico had her full share of suffering from this cause.

The large number of Indian depredation claims now in progress of adjudication by the Government affords some idea of the destruction of property by the Indians, but numerous graves, to be found in all parts of the Territory, testify to the loss of human lives and the valor of her native people. Happily those days of death and destruction are gone, and gone forever, by reason of the wise and humane policy of our Government toward the Indians.

In those early wars New Mexico rendered material assistance to the Government by organizing and equipping her militia and sending them

into the field, where they rendered valuable services in subduing those savage tribes. Several thousands of the citizens of the Territory served as soldiers during those Indian wars, but I regret that, owing to primitive methods of keeping records in those early days, it is impossible for me to give an accurate list either of those engaged or of those who fell in those wars.

THE CIVIL WAR.

In the war between the States, commonly called the war of the rebellion, New Mexico responded promptly, and, according to the records, sent into the field in defense of the Union 6,561 soldiers, a large majority of whom were natives. Four thousand four hundred and thirty-two of these were enlisted for three years; they were engaged at Valverde, Glorietta Mountains, San Augustine, Peralta, and other battles, and 277 of them were killed in battle or died from wounds and other causes.

Many citizens of New Mexico entered the Union Army in other regiments and at other places, so that the records do not show the entire number of soldiers furnished by the Territory. I fully believe, from investigation, that New Mexico furnished about 9,500 soldiers to the Union Army during the civil war, or about 10 per cent of the entire population of the Territory, and none at all to the Confederate army, so far as I am able to ascertain.

THE SPANISH-AMERICAN WAR.

When war was declared between the United States and Spain, New Mexico was alive with enthusiasm. A telegram from the War Department authorizing the enlistment of a squadron, or four troops, of cavalry for the First United States Cavalry was received by me on the 25th day of April, 1898, and on the 6th day of May following the entire number was mustered in in accordance with the call, and they left Santa Fe on the following day, May 7, for the concentration camp at San Antonio, Tex. Later a call was received for 100 more men from New Mexico for the same regiment, and they were recruited, mustered in, and went to the front within ten days after the call was received.

For this regiment, now familiarly known as "Roosevelt's Rough Riders," New Mexico furnished about 500 officers and men. A large majority of these were young men, many of them being under the age of 21 years, and were recruited from all the walks of life. Among them were many college students, business men, clerks, ranchmen, cowboys, miners, etc. Most of them were accustomed to the saddle and capable of being ideal cavalry soldiers. These men, with their regiment, participated in the battle of Las Guasimas, and the daring charge and capture of San Juan Hill, near Santiago de Cuba, and their deeds of valor, now known to the nation and the civilized world, will in future form one of the brightest pages in our military history.

Still another call was received from the War Department for four companies of infantry to form a part, or one battalion, of a regiment called the Arizona-New Mexico-Oklahoma-Indian Territory United States Volunteer Infantry. Within a very few days after this call was received the 15 officers and 424 noncommissioned officers and privates left New Mexico for Whipple Barracks, Ariz. These four com-

panies were recruited at four of the principal cities of the Territory—Santa Fe, Las Vegas, Albuquerque, and Las Cruces. Men from all parts of the Territory enlisted in them, and these soldiers were composed of robust and enthusiastic young men who are creditable alike to the Territory and the nation.

More men responded under each call than were required to fill our quota, and in their eagerness to serve their country it is estimated that 150 enlisted in the Regular Army and in regiments from the States, and some of whom are now with the army in the Philippine Islands. Thus, New Mexico has furnished 1,089 soldiers for the late war, and would and could have furnished many more had the opportunity been afforded us.

In the last call made by the President for ten additional regiments New Mexico furnished 121 men for service in the Philippines and stands ready to-day to furnish her proportion whenever needed or called upon by the President.

REPORT OF THE BUREAU OF IMMIGRATION.

SIR: During the year ending September 1, 1899, the bureau of immigration has been reorganized and its office removed from Albuquerque to Santa Fe.

The bureau as at present organized consists of L. Bradford Prince, Rio Arriba County, president; Frank Springer, San Miguel County, vice-president; F. Lowenthal, Bernalillo County, treasurer; W. A. Hawkins, Otero County; C. A. Campbell, Eddy County; and Max. Frost, Santa Fe County, secretary.

A commodious office has been rented at Santa Fe and neatly furnished, and the secretary has under the instructions of the bureau commenced to make a collection of mineral specimens from various parts of the Territory for the purpose of keeping a permanent exhibit in Santa Fe for the inspection and investigation of capitalists, mining promoters, and miners.

During the year ending September 1, 1899, 1,228 letters written by persons in the United States, Canada, and some coming from England and Germany, asking information concerning the climate, resources, development, and general condition of New Mexico, have been received and answered, and in each case pamphlets descriptive of New Mexico and its agricultural possibilities, of its mineral wealth, of its magnificent climate, its people, its schools, its higher educational institutions, and, in fact, everything connected with New Mexico have been sent to the writers of these letters. Numerous marked copies of New Mexico papers containing write-ups descriptive of our Territory have also been so mailed.

The supply of these pamphlets printed during the year 1898 is exhausted, and the bureau officers now have under work and in course of process new descriptive matter of the Territory, which when completed and printed will show the latest development and material condition of New Mexico up to the present writing.

In addition to the publications of the bureau during the past year the bureau ordered and paid for 1,000 extra copies of the report of the governor, Miguel A. Otero, made to the honorable Secretary of the Interior, for the year 1898. Every copy has been distributed, and there is now on hand over 500 requests for the report of the governor to be submitted to the Secretary of the Interior and to be printed for the current year. The reports of the governor are in great demand and have proven to be most valuable and comprehensive works of reference for the Territory.

Respectfully submitted.

MAX. FROST,
Secretary Bureau of Immigration, Territory of New Mexico.

Hon. M. A. OTERO,
Governor of New Mexico, Santa Fe, N. Mex.

NEW MEXICO PENITENTIARY,
Santa Fe, N. Mex., September 1, 1899.

SIR: In accordance with your request I have the honor to herewith submit report of the condition of the New Mexico Penitentiary as follows, to wit:

On May 1, 1899, there were confined in the penitentiary 192 convicts, of which

number 37 are sentenced to life imprisonment, 4 for ninety-nine years, 2 for ninety years, and 1 for sixty years. Since May 1 to the present time, September 1, 1899, 19 prisoners have been received, 26 have been discharged, and 2 have escaped.

DISCIPLINE.

The discipline and behavior of the prisoners is and has been entirely satisfactory to the management. They are, as a rule, well behaved, obedient, and willing to perform such labor as may be assigned to them.

PUNISHMENT.

In the matter of punishment some changes have been made, the "dark cell" and stringing up by the hands having been abolished. The board of penitentiary commissioners at their July meeting adopted the "spanking" system which was inaugurated by Warden Hoyt, of the Colorado Penitentiary. This system has worked admirably, and has reduced the number of punishments at least 75 per cent. No convict has so far given cause for being punished the second time after having had a trial dose administered under the above system. It seems that it is not so much the physical punishment that has proven effective, but rather the humiliation, which seems to have a very decided moral effect upon the prisoners. The penitentiary physician is always present when punishments are administered. Authorities of considerable experience seem to share the view that this is the most humane and effective way to maintain discipline and exact compliance to the rules and regulations of the institution. For minor offenses other punishments are inflicted—taking away a ration of tobacco, the locking up in their cell in solitary confinement for a day, or perhaps a reprimand, as the nature of the case may require—the main object of the management being to maintain discipline and the strict compliance with the rules and regulations as set forth by the board of penitentiary commissioners, with as few punishments as possible, upon the theory that prisoners are sent here for the purpose of reform rather than persecution.

EMPLOYMENT.

All of the prisoners are kept continuously employed. Out of the aforesaid number an average of about 45 have been employed daily assisting in the construction of the Territorial capitol building; an average of which 5 have been employed as stonecutters, 2 to 4 as bricklayers, some as carpenters, others as laborers, and have given general satisfaction in the discharge of their respective duties. An average of about 12 have been employed during the last seventy days making ditches and laying sewer-pipe system for the city of Santa Fe, the same having been completed a few days ago. The above labor is required by the Territorial law to be furnished free of cost, and therefore no revenue has accrued therefrom to the credit of this institution. The balance of the prisoners are kept employed in different lines of occupation inside of the penitentiary grounds, as follows: In the bakery, 3; in the kitchen, 11; in the dining room of the superintendent, 1; in guards' dining room, 1; as bell boy, 1; as carpenters, 3; blacksmith shop, 5; laundry, 9; in the cell house, 4; barbers, 4; as druggist, 1; boiler house, 2; shoemakers, 4; tailors and repairers, 15; painters, 2; hostler, 1; teamsters and helpers, 5; power-house, 5; gardeners, 8; limekiln, 8; stonecutters, 14; stone breakers, 8; carrying water, 1; attending hogs and poultry, 2; greenhouse, 1; front yard, 1; scavengers, 1; partly insane, 1; incapacitated, 1; in the hospital, 5; gate man, 1; bricklayers, 6; balance as laborers in the yard; tin shop, 1.

IMPROVEMENTS.

The following is a partial list of improvements made and under construction during the past four months:

One line of steam pipe from power house to well, a distance of 300 feet, one 4-inch Knowles pump, 4-inch pipe from well to tank, cost of pump and material $500; also 675 feet of 3-inch pipe now being laid for the purpose of making connection with the water main and reservoir in order to insure a constant and sufficient water supply; ten new institution iron spring beds for hospital, new water-closet for the same, one operating table, ten hospital bedside tables, closets for sheets, bureau, etc., painting and renovating hospital, approximate value including 675 feet of pipe, $1,000; renovating and painting, etc., main office, superintendent's office, physician's office, superintendent's dining room, quarters for employees, total cost approximately, $200; tinner's outfit for tin shop $250; value of tinware, ironware, etc., manufactured by convict labor, cost of the same in the open market, exclusive of material as a basis, will amount to $500; one modern brick-

kiln now under construction, when completed will burn 300,000 brick at a burning and have a cash value of $1,500; a complete brick outfit has been purchased from C. W. Raymond & Co., of Dayton, Ohio, upon which a cash payment of $1,995 has been made, total cost of which will amount, including freight, to $5,000. The above will include machinery for the manufacture of common, repress, and sidewalk brick. Work is also being carried on in the erection of an additional cell house.

COST OF MAINTENANCE.

The actual cost of feeding the prisoners during the past four months has been as follows: May, 14.9 cents per day per man; June, 15.18 cents per day per man; July, 14.25 cents per day per man; August, 14.12 cents per day per man.

Cost of beef, $7.28 per hundredweight; flour, $1.82 per hundredweight.

Financial condition September 1, 1899.

CONVICT'S EARNINGS.

Total amount received from March 1, 1899, to September 1, 1899	$3,064.13
Total disbursed during above period	1,063.69
Balance on hand	2,000.44

GENERAL EXPENSE FUND.

Total amount received by apportionments of appropriation for the fiftieth fiscal year, March 1, 1899, to September 1, 1899	$23,058.00
Disbursed during above period	14,038.39
Balance on hand	9,019.61

PENITENTIARY SALARY FUND.

Total amount received by apportionments of appropriation for the fiftieth fiscal year, March 1, 1899, to September 1, 1899	$6,835.03
Disbursed during the above period	4,776.62
Balance on hand	2,058.41

RECAPITULATION.

Total received from all sources	$32,957.16
Total disbursements	19,878.70
Total on hand	13,078.46

Respectfully submitted.

H. O. BURSUM, *Superintendent.*

Hon. MIGUEL A. OTERO.
Governor of New Mexico, Santa Fe, N. Mex.

LAS VEGAS, N. MEX., *September 1, 1899.*

SIR: We take pleasure in submitting herewith reports of the medical superintendent and steward of the asylum for the year ending June 30, 1899. You will notice that they cover all the points very thoroughly and leave little for us to add.

The last legislature gave us a levy of 1 mill, which is an increase of one-quarter of a mill over the present levy.

We will not, however, begin to derive the benefit from this increase until next year, and in the meantime, with the increase in patients and the additional expense that naturally follows, we are running very close with regard to our finances. In our report to the legislature we requested them to give us a special levy for the improvement of the administration building, with the view of devoting more of it to the accommodation of the better class of patients, but our request was not granted, owing no doubt to the large number of demands made upon them and to their feeling the necessity of holding the expenditures down to the lowest possible notch. It is unfortunate, however, that we have not the funds to put this building in better condition, and our hope at this time is that the increased levy of next

year will be large enough to enable us to make these improvements after taking care of the usual running expenses. We submit the reports herewith without further comments on our part.

Respectfully,

J. W. ZOLLARS,
MARCUS BRUNSWICK,
FRANK CROSSON,
BENIGNO ROMERO,
F. H. PIERCE,
Directors.

Hon. MIGUEL A. OTERO,
Governor of New Mexico, Santa Fe, N. Mex.

LAS VEGAS, N. MEX., *July 1, 1899.*

SIRS: In compliance with your request I beg leave to make the following report for the year ending June 30, 1899:

The number of patients remaining in the asylum June 30, 1898, was 57, of which 33 were males and 24 females. During the year there have been 45 admissions, of which 27 were males and 18 females.

A total of 102 patients have been treated during the year. The average daily attendance for the year has been 77. The number of discharged has been 15, as follows:

Cured	2
Improved	4
Unimproved	1
Died	8
Total	15

The causes of death have been as follows:

Inanition	2
Chronic diarrhea	1
Cerebral hemorrhage	1
Ptomaine poisoning	1
Maniacal exhaustion	2
Epilepsy	1
Total	8

The total number of patients remaining in the institution June 30, 1899, are 91, of which 52 are males and 39 are females, classified as follows:

Acute mania	2
Chronic mania	24
Dementia	57
Epileptic insanity	5
Insanity of adolescence	2
Moral insanity	1
Total	91

By referring to the above table you will notice that there has been but little, if any, change in the class of patients compared with my last report, in that the greater number of them are hopelessly incurable, most of them having been confined in the damp, dark, and ill-ventilated county jails for years without adequate care and treatment before admission to this institution. This will account for the small number discharged as cured.

Since the last fiscal report the new buildings have been completed, this has made a great change for the better in the treatment and care of our unfortunate insane. The entire new addition is well heated and ventilated and is lighted by electricity. The new part was ready for the reception of patients September 1, 1898.

The health of the inmates has been very good during the year just past, there having been no epidemics among them. Though the number of patients allowed each county was doubled in August, 1898, and since then the quota of many counties has been filled mostly by chronics and incurables, leaving but little or no room for recent cases, and it is from the latter class of patients that we may reasonably expect a very large per cent of recoveries if placed early under favorable surroundings and appropriate treatment. Of the patients remaining in this institution

June 30, 1899, 74, or over 81 per cent, may be classed as incurable. It can be safely estimated that there are about 200 insane persons in the Territory of New Mexico, or one to every thousand of population.

While the year just passed has witnessed many improvements in and about the institution, we must not be unaware of the fact that we have not yet reached that degree of perfection which we would desire; many things remain to be done; many anticipations to be realized. The one thing we should keep prominently in view is that this is a hospital for the treatment of the insane rather than a home for the accommodation of incurables. There being a limited amount of room, we should at least limit the number to be admitted of those that are manifestly hopeless. If there were sufficient room it would not be necessary or desirable to deny admission to any, but as there is not these discriminations should be made in favor of recent and presumably curable cases. If this discrimination is not made, in a very short time the hospital will be entirely filled with chronics and incurables, and then those who might be benefited by hospital residence and treatment will be permanently excluded and they, in turn, swell the already too large number of the most pitiable of human beings. This policy would, in individual cases, seem to work a hardship, but when considered from the broad view of accomplishing the greatest amount of good for the very limited amount of money at our disposal, it must be considered as correct and should be adopted.

Besides the improvement in buildings, there has been much work done on the yard and garden in grading and terracing, a system of sewerage, planting of fruit and shade trees, as well as of shrubbery and many flowers of different varieties; most of the labor having been done by the patients, all of which have afforded healthful occupation to a number of the inmates, besides lending a more attractive appearance to the grounds and comfort to the unfortunates, and the garden has afforded a great abundance of delicious vegetables which have materially reduced the cost of maintenance of the institution. Not only have the patients been employed by outside work, but they have been occupied also inside by sweeping, scrubbing, doing dining-room and laundry work. The female patients have been engaged in household duties, sewing, and fancy work, according to individual capacity. At all times much care is observed not to overtax any patient.

Much the greater number of patients are idle because their mental and physical condition renders them incapable of doing any kind of work. When the weather permits the inmates are allowed a daily walk outside the hospital grounds, and every month dancing, music, and other entertainments are allowed much to the enjoyment of the patients.

The present available room, principally in the new addition, will accommodate about one hundred persons, and twenty more may be afforded adequate quarters as soon as we can have the old building renovated. The old building, known as the administration building, is now almost uninhabitable because of its being out of repair. For about five years this part of the institution has been very much overcrowded, literally filled from cellar to attic, and during this period but little repairing has been possible. The floors, doors, and much of the other woodwork must be put in new, partition walls changed, almost if not all of the building must be replastered, fixtures and plumbing in great part replaced in toilet and bath rooms, many changes and repairs and renovations are most urgently needed to meet the present demand.

During the meeting of our legislature last winter strenuous efforts were made to secure a special appropriation sufficient to make the above-mentioned repairs but I am sorry to say we were disappointed.

We have at present about 6 acres in garden and 3 acres in alfalfa, cared for by some of the few male patients capable of doing manual labor, the returns of which make a very noticeable reduction in our running expenses. We are now feeling, more than ever before, the lack of sufficient land for garden and farming purposes, and will feel this need still more in the early future. If an additional tract of land, under irrigation, though small, could be placed at our disposal enough could be produced at a very slight expense to keep many hogs, poultry, and more milch cows, and beef might be grown and fattened, which would further diminish the running expenses of the plant.

I will presume to suggest that measures be taken to secure not less than 60 acres more land under ditch.

Very respectfully,

W. R. TIPTON,
Medical Superintendent.

The BOARD OF DIRECTORS OF THE INSANE ASYLUM OF NEW MEXICO.

LAS VEGAS, N. MEX., *August 15, 1899.*

DEAR SIR: I have the honor to submit the following report of the transactions of the department under my charge of the insane asylum of New Mexico from November 1, 1898, to June 30, 1899:

The average daily attendance of patients was 77.

Number of meals furnished, 55,902.

Total cost of food supplied consumed, $2,700, making cost per meal, 4.83 cents; cost per day, 14.49 cents; per month, $4.38¼; for the eight months above mentioned, $35.06¼, or an average yearly cost for each patient of $52.59¼.

The hospital for the insane has about 19 acres of land, 6 of which are being used in the cultivation of a vegetable garden, 3 acres are in alfalfa, the remainder being used for parks and pasture.

Five hundred and twenty-two shade trees were set out last spring taken from the hospital nursery.

A number of patients have been taught to cultivate the garden truck and 50,000 to 60,000 pounds of various kinds of vegetables adapted to this section of the country are yearly grown on these grounds, portions of which are consumed by the patients and the balance fed to stock.

The grading and excavating of the grounds is being continued daily and we hope soon to have the entire grounds in good shape.

The prospect for a good crop of vegetables this season is excellent.

Respectfully submitted.

G. W. WARD, *Steward.*

The PRESIDENT OF THE BOARD OF DIRECTORS
OF THE INSANE ASYLUM OF NEW MEXICO.

TAOS, N. MEX., *August 1, 1899.*

SIR: I have the honor to submit the following report for the New Mexico Territorial board of health.

HISTORICAL NOTE.

In 1882 there was adopted by the legislature of New Mexico, and approved, a statute regulating the practice of medicine, its details resembling the then existing statute of Illinois; but being unsatisfactory to the medical profession, and adversely criticised by the bar, various futile efforts were made by the New Mexico Medical Society to secure a better statute. In September, 1894, the Territorial board of medical examiners, in session at Albuquerque, appointed a committee of three of its members, who, with the president of the board, and the president of the New Mexico Medical Society, should prepare a bill looking to a better statute. In January, 1895, such a bill was ready, and having met the approval of a majority of the board, and of the officers of the New Mexico Medical Society, was presented to the legislature then in session. It became a law, but in its passage received several unnecessary alterations, which are indicated in this reprint by the sentences in italics. An attempt was made in drafting this bill to utilize the best materials from kindred statutes throughout the United States, as well as our own considerable experience.

AN ACT to regulate the practice of medicine and to establish a Territorial board of health in the Territory of New Mexico. Approved February 27, 1895.

Be it enacted by the legislative assembly of the Territory of New Me ico.

SECTION 1. Qualifications for practice: That no person shall practice medicine in any of its departments in this Territory unless such person possesses the qualifications required by this act. If a graduate in medicine, he must present his diploma by mail or in person to the Territorial board of health for verification as to its genuineness.

If the diploma is found genuine, and from a legally chartered medical institution in good standing, and if the person named therein be the person claiming and presenting the same, the Territorial board of health shall issue a certificate to that effect, signed by all the members thereof, and such certificate shall be conclusive as to the right of the lawful holder of the same to practice medicine in this Territory. If not a graduate, the person practicing medicine in this Territory shall present himself before said board and submit himself to such examination as the board may require, and if the examination be satisfactory to the board, the said board shall issue its certificate in accordance with the facts, and the lawful holder of such certificate shall be entitled to all the rights and privi-

leges herein mentioned: *Provided*, That any person who shall have practiced medicine continuously for the period of ten years in this Territory prior to the passage of this act shall be entitled to a license or certificate without examination, upon the payment of the fee for such license or certificate.

SEC. 2. Territorial board of health—Organization: That a board is hereby established which shall be known under the name and style of the "New Mexico Territorial Board of Health," to be composed of seven practicing physicians of known ability and integrity, who are graduates of medical schools of undoubted respectability, and holding licenses to practice in this Territory, giving each of the three schools of medicine (known as the regular, homeopathic, and eclectic schools) a representation, as follows, to wit: Four physicians of the regular, two of the homeopathic, and one of the eclectic school or system of medicine. The members of this board shall be appointed by the governor, and shall hold their office two years, and all vacancies shall be similarly filled as soon as the governor is notified thereof by the secretary of the board.

The Territorial board of health shall organize within three months after the passage of this act; it shall procure a seal, and shall receive through its secretary applications for certificates and examinations; the president and secretary shall have the authority to administer oaths, and the board shall take testimony in all matters relating to its duties; it shall issue certificates to all who furnish satisfactory proof of having received diplomas or licenses from legally chartered medical institutions in good standing, as may be determined by the board. Applicants for certificates, being graduates, or to all who now have licenses to practice in the Territory, issued by the present or former board of medical examiners, shall pay a fee of five dollars to the secretary of the board, who shall turn the same into the treasury of the board.

SEC. 3. Verification of diploma—Affidavit: The verification of the diploma or certificate shall consist in the affidavit of the holder and applicant that he is the lawful possessor of the same, and that he is the person therein named; and any person swearing falsely shall be deemed guilty of perjury and shall be punished accordingly.

SEC. 4. Examinations by board: All examinations of persons not graduates or licentiates shall be made directly by the board, and may be made in whole or in part in writing, and shall be of an elementary and practical character, sufficiently strict to test the qualifications of the candidate as a practitioner. The fee for examination shall be twenty dollars, and said fee shall be paid into the treasury of the board.

SEC. 5. County clerk to record: Every person holding a certificate from the Territorial board of health shall have it recorded in a book provided for the purpose in the office of the clerk of the county in which he resides, within three months from its date, and the date of recording shall be endorsed thereon; he shall then be entitled to practice in any part of the Territory, but must again record his certificate in case of removing his permanent residence to another county.

SEC. 6. Refusal or revocation of certificate: The Territorial board of health must refuse to issue certificates to individuals guilty of unprofessional or dishonorable conduct, and it may revoke certificates for like causes.

SEC. 7. Definition of "to practice medicine:" For the purposes of this act, the words "practice medicine" shall mean to investigate or diagnose, or offer to investigate or diagnose, any physical or mental ailment of any person, with a view to affording relief, as commonly done by physicians; to suggest, recommend, prescribe or direct, for the use of any person, any drug, medicine or appliance, apparatus or other agency, whether material or not material, for the cure, relief, or palliation of any ailment or disease of the mind or body, or for the cure or relief of any wound, fracture, or bodily injury or deformity, after having received, or with the intent of receiving therefor, either directly or indirectly, any bonus, gift, or compensation: *Provided*, This act shall not prevent people who are entitled to sell medicine under the laws of this Territory from recommending the same; but nothing in this act shall be construed to prohibit gratuitous service in cases of emergency, or the domestic administration of family remedies, or women from practicing midwifery; and that this act shall not apply to surgeons in the service of the United States in the discharge of their official duties.

SEC. 8. Penalty for practicing without certificate—Using another's diploma: Any person practicing medicine or surgery in this Territory without the certificate issued by this board, in compliance with the provisions of this act, shall, for each and every instance of such practice, forfeit and pay to the Territory of New Mexico, for the use of the said Territorial board of health, the sum of one hundred dollars for the first offense and two hundred dollars for each subsequent offense, the same to be recovered in an action of debt before any court of compe-

tent jurisdiction; and any person filing, or attempting to file, as his own, the diploma or certificate of another, or a forged affidavit of identification, shall be guilty of a felony, and, upon conviction, shall be subject to such fine and imprisonment as are made and provided by the statutes of the Territory for the crime of forgery.

SEC. 9. Judgment upon conviction—Appeal: Upon conviction of either of the offenses mentioned in this act, the court shall, as part of the judgment, order that the defendant be committed to the common jail of the county until the fine and costs are paid, and, upon failure to pay same immediately, the defendant shall be committed under said order: *Provided*, That either party may appeal in the same time and manner as appeals may be taken in other cases, except that where an appeal is prayed in behalf of the Territory no appeal bond shall be required to be filed, whether the appeal be from a justice of the peace, or from the district, county, or circuit court, or from the appellate court, but it shall be sufficient in behalf of the Territory of New Mexico for the use of the Territorial board of health to pray an appeal, and thereupon appeal may be had without bond (or) security.

SEC. 10. Solicitor-general and district attorneys to prosecute: It shall be the duty of the solicitor-general and the district attorneys to prosecute any and all persons who shall be guilty of violating the provisions of this act.

SEC. 11. Repeal: All laws and parts of laws in conflict with the provisions of this act are hereby repealed, and this act shall be in force and effect from and after its passage.

Since the passage of the foregoing act there has been 137 physicians licensed by the board.

The board does not recognize diplomas from medical schools that do not require a four-year high-school course or its equivalent before matriculation, and four years' course of study, no two courses of lectures the same year.

All applicants with diplomas from medical colleges below this standard must pass a satisfactory examination.

All foreign diplomas must be supplemented by an examination.

All applicants must furnish satisfactory evidence of good moral and professional standing.

Three licenses have been revoked for unprofessional and dishonorable conduct.

The only duties of this board are to carry out the provisions of law regulating the practice of medicine, and it has no authority in other matters of public health.

The medical board should be empowered by an act of the next legislature to pass all necessary rules and regulations in regard to public health—particularly of our larger towns and cities—restrict and quarantine cases of epidemic disease. It should have power and funds, when necessary, to enforce a rigid quarantine.

The following resolution was passed by the board at its meeting June 19, 1899:

"Examinations will be required of all applicants to practice medicine in New Mexico who shall graduate after July 1, 1897, from any medical college which does not require of matriculants, as a minimum evidence of sufficient general education, a high-school certificate or its equivalent, and, for graduation, proof of four years' study of medicine and four terms of lectures occurring in four separate years.

"The previous standard of three years' study and three terms of lectures in three separate years, with the preliminary requirement of matriculants of a high-school certificate or its equivalent, will be maintained for all applicants who graduated between July 1, 1890, and July 1, 1897.

"According to a resolution of the New Mexico Territorial Board of Health, adopted April 24, 1899, each applicant must furnish, as references regarding moral character and professional standing, two or more names of reputable physicians, preferably the president and secretary of state licensing board, or president and secretary of State medical society of State where applicant last resided."

Respectfully submitted.

T. P. MARTIN, M. D., *Secretary.*

Hon. MIGUEL A. OTERO,
Governor of New Mexico.

BOARD OF PHARMACY.

I have the honor of submitting herewith the ninth annual report of the New Mexico Board of Pharmacy, to December 1, 1898. On account of the limited amount of funds at the disposal of the board, the reports have usually been confined to a typewritten document to the governor only. This report is intended

to be more complete, and embraces about all that is of interest to the pharmacists of the Territory, showing as it does the work of the board, with a complete financial statement and a list of registered pharmacists, minor pharmacists, and temporary certificates; also, a copy of the original pharmacy law, with its amendments, and the poison law.

The condition of pharmacy in our Territory is apparently better than at any time since the law was enacted, and the druggists seem to understand and observe the law more closely. No instance of open or intentional violations of the law have been brought to the notice of the board, and the few minor irregularities have been satisfactorily corrected without the necessity of resorting to the expense or annoyance of a suit.

The board is pleased to observe that the standard of our profession in New Mexico is gradually assuming a position equal to that of any of the States, and desires to express its appreciation of the earnest support and assistance rendered by the pharmacists of the Territory.

The meetings of the board have been held semiannually, as the law provides, except in a few instances when the funds were insufficient to defray the expenses. The minutes of the meetings are not of sufficient interest to warrant their publication in this brief report, but they are open to inspection at any time to anyone interested.

Examinations are conducted, both oral and written, and it is the policy of the board to thoroughly test the practical ability of the applicant, and to maintain a standard equal to that of any of the older State boards.

During the year 1898 two meetings have been held. One at Silver City on March 20 and 21, and one at Albuquerque on October 5 and 6.

At Silver City there were four applications on file, but only one candidate being present for examination, viz, J. E. Irvine, Deming, who was successful.

At the meeting in Albuquerque six applications were on file. The following passed successful examinations: Robert Mann, Albuquerque; Chris Christensen, Albuquerque; Mrs. Emily K. Hilton, Socorro.

Aside from the above twelve have been registered on diplomas and credentials from other State boards.

It is to be regretted that the New Mexico Pharmaceutical Association does not receive more earnest support. This association was temporarily organized in 1893, and at a subsequent meeting held at the San Felipe Hotel, Albuquerque, September 20, 1894, a permanent organization was effected, but on account of lack of attendance and interest no meeting has been held since the latter date.

It is desirable that this association should be perpetuated, not only for educational and commercial benefits, but as an assistant and stimulant to the board of pharmacy.

In most of the States the pharmaceutical associations recommend or nominate the appointees for membership of the pharmacy boards, and in this way our association could assist in the selection of, or recommend to the governor, the names of such as would be most satisfactory or best qualified for appointment.

Respectfully submitted.

W. C. PORTERFIELD,
Secretary and Treasurer.

LIST OF MEMBERS OF THE BOARD, WITH DATE OF EXPIRATION OF TERM FOR WHICH THEY WERE APPOINTED.

Bernardo Ruppe, Albuquerque; term expires March 19, 1903.
E. G. Murphy, Las Vegas; term expires March 19, 1902.
W. C. Porterfield, Silver City; term expires March 19, 1901.
M. G. Paden, White Oaks; term expires March 19, 1900.
A. J. Fischer, Santa Fe; term expires March 19, 1899.

FINANCIAL STATEMENT.

1898.	
Mar. 20. Balance on hand last report	$196.20
Nov. 1. 70½ renewal fees	141.00

DUTIES OF THE SECRETARY.

It shall be the duty of the secretary to attend all meetings of the board, and make a full record of the proceedings of the same; he shall keep a book of registration, in which shall be entered the names and places of business of all persons registered under the pharmacy law; also specify such facts as said persons shall

claim to justify their registration. The secretary shall prepare all certificates ordered by the board, and shall notify each member by mail of the meetings of the board, and do such other clerical work as the board may direct; he shall give such bond, to be approved by the board, as the board may from time to time direct.

He shall keep a full account of all moneys received and disbursed, and specify for what purposes, and make a full report of receipts and disbursements and amount of cash on hand, at each regular meeting, or whenever it is demanded by the board.

MEETINGS.

The regular meetings of the board shall be held semiannually, as a majority of the board may direct, and at such place as they shall elect. Upon the written application of three members of the board the president shall call special meetings of the board, and shall cause notice thereof to be given to each member at least seven days in advance of such meeting.

STANDING COMMITTEES.

The committee on complaints and grievances: The duties of the committee on complaints and grievances shall be to carefully examine into all complaints and grievances made to the board pertaining to the violation of the pharmacy law, except adulterations and the sale of poisons. All such complaints and grievances shall be referred to said committee and a written report submitted thereon.

COMMITTEE ON ADULTERATIONS AND POISONS.

The duties of the committee on adulterations and poisons shall be to carefully examine into all complaints made to the board pertaining to violations of the pharmacy law in regard to adulterations and the sale of poisons; and all such complaints shall be referred to said committee, and a written report made thereon, before an analyst or chemist can be employed, or any prosecution shall be ordered by the board.

COMMITTEE ON AUDITING AND FINANCE.

The duties of the committee on auditing and finance shall be to carefully examine into all claims presented to the board for payment and to report upon the correctness and allowance of the same; to examine the books and accounts of the secretary and treasurer, and make recommendations as to the manner and form in which such books and accounts shall be kept; to report at the regular meetings of the board upon the condition of the books and accounts of the secretary and treasurer, the amount of receipts and expenditures for the fiscal year, and the amount of cash on hand.

RULES.

Rule 1.—Any member of the board may, upon presentation of credentials or other satisfactory evidence of capability, grant a temporary certificate, which shall expire at the next meeting of the board. It shall also be the duty of any member of the board, in his respective district, to see that all practicing pharmacists renew their annual certificates; and that they have a general supervision over their districts, respectively, and shall report all infractions of the law to the board and their action taken in behalf of the same.

Rule 2.—Registered pharmacists who change their location must report the same within ten days, giving their present address to the secretary.

Rule 3.—Proprietors of pharmacies not registered themselves, who conduct pharmacies under charge of a registered pharmacist, must report any change they may make in said registered pharmacist within ten days after such change occurs.

Rule 4.—This board will recognize certificates issued by other State boards which have been granted by examination, wherein a grade of at least 75 per cent has been attained and a practical experience of at least three years is required. A certificate from the secretary of such board to that effect must accompany the application.

Rule 5.—This board recognizes diplomas from an incorporated college or school of pharmacy that requires a practical experience in pharmacy of not less than three years before granting a diploma.

NEW MEXICO PHARMACY LAW.

[Compilation of 1897.]

SEC. 3717. That from and after the passage of this act it shall be unlawful for any person, not a registered pharmacist within the meaning of this act, to conduct any drug store, pharmacy, apothecary shop, or store for the purpose of retailing, compounding, or dispensing medicines in the Territory of New Mexico, except as hereinafter provided.

SEC. 3718. That it shall be unlawful for the proprietor of any such store or pharmacy to allow any person except a registered pharmacist to compound or dispense the prescriptions of physicians except as an aid to and under the supervision of a registered pharmacist. Any person violating the provisions of this section shall be deemed guilty of a misdemeanor, and on conviction shall be liable to a fine of not less than five nor more than one hundred dollars.

SEC. 3719. The governor shall appoint five persons, all of whom shall have been residents of the Territory for three or more years and of at least eight years' practiced experience as druggists or pharmacists, who shall be known and styled the Board of Pharmacy for the Territory of New Mexico, one of whom shall hold the office for five years; one for four years; one for three years; one for two years; one for one year in the first instance, and thereafter the governor shall annually appoint one person to serve as a member of the board for five years. The persons so appointed shall constitute the board of pharmacy, and shall hold the office for the term for which they were appointed, or until their successors are duly appointed and qualified. They, the said board, and each of them, shall, within ten days after their appointment, or being apprised of the same, take and subscribe the usual official oath before a properly qualified officer of the county in which they reside. The said board shall organize within thirty days from and after their appointment and annually thereafter by the election of a president and secretary. A majority of the board shall constitute a quorum for the transaction of business. Said board shall have the power to make by-laws and all necessary regulations for the proper fulfillment of their duties under this act without expense to the Territory. Any vacancy occurring in said board shall be filled by an appointment by the governor for the unexpired term.

SEC. 3720. The board of pharmacy shall register in a suitable book, a duplicate of which shall be kept in the office of the secretary of the Territory, the names and places of residence of all persons to whom they issue certificates and the dates thereof. It shall be the duty of said board of pharmacy to register, without examination, as registered pharmacists, all druggists and pharmacists who are engaged in business in the Territory of New Mexico at the passage of this act, as owners, principals, or clerks of stores for retailing, compounding, or dispensing drugs, medicines, or chemicals for medical use, or for compounding and dispensing physicians' prescriptions: *Provided*, No druggist's clerk shall be so registered unless he be eighteen years of age and has been engaged in some store or pharmacy where physicians' prescriptions were compounded and dispensed, for the space of three years next preceding the passage of this act. In case of the failure or neglect of any person to apply for registration within sixty days after the organization of the said board of pharmacy, he shall have forfeited the privilege of registering without examination, and shall only be registered after examination as set forth in section three thousand seven hundred and twenty-one.

SEC. 3721. That the said board of pharmacy shall upon application, and at such time and place and in such manner as they may determine, examine each and every person who shall desire to conduct the business of selling at retail, compounding and dispensing drugs, medicines, or chemicals for medical use, or compounding or dispensing physicians' prescriptions as pharmacists in the Territory of New Mexico, and if a majority of said board shall be satisfied that said person is competent and fully qualified to conduct said business of compounding or dispensing drugs, medicines, or chemicals for medical use, or to compound and dispense physicians' prescriptions, they shall enter the name of such person, as a registered pharmacist, in the book provided for in section three thousand seven hundred and twenty: *Provided*, That all graduates in pharmacy having a diploma from an incorporated college or school of pharmacy that requires a practical experience in pharmacy of not less than three years before granting a diploma may, in the discretion of the board be entitled to have their names registered as registered pharmacists by said board, without examination. The board of pharmacy shall issue an appropriate certificate to each person registered, which certificate must be conspicuously displayed in every store or place described in this section. Said certificate must be renewed twelve months after each date of issue.

SEC. 3722. The board of pharmacy shall be entitled to demand and receive from

each person whom they register and furnish a certificate as a registered pharmacist, without examination, the sum of two dollars, and for each and every person whom they examine the sum of five dollars, which shall be in full for all services. In case the examination of said person shall prove defective and unsatisfactory to the board and he be declined registration, he shall be permitted to present himself for reexamination within twelve months thereafter and no charge shall be made for such examination.

SEC. 3723. The board of pharmacy shall hold semiannual sessions at such times and places as the board may determine; other sessions of the board may also be held whenever and wherever a quorum of the board is present.

In the interim of the sessions of the board and upon satisfactory evidence of a fitness of an applicant, any one member of the board may, in his discretion, issue a temporary certificate, which shall authorize and empower the holder to conduct a drug store or pharmacy as set forth in section three thousand seven hundred and twenty-one. Such temporary certificate must be signed by one member, and shall expire and terminate at the date of the next succeeding semiannual session of the board after the granting thereof. No fee shall be demanded for the temporary certificate.

SEC. 3724. Every owner of a drug store in the Territory of New Mexico shall be held responsible for the quality of all drugs, chemicals, and medicines he may sell or dispense, with the exceptions of those sold in the original packages of the manufacturer or wholesale dealer, and also those known as proprietary medicines. And should he knowingly, intentionally, and fraudulently adulterate or cause to be adulterated such drugs, chemicals, or medical preparations, he shall be deemed guilty of misdemeanor, and upon conviction thereof his license as a registered pharmacist shall be thereby revoked, and in addition thereto be liable to a penalty not exceeding five hundred dollars.

SEC. 3725. Any person who shall procure or attempt to procure registration for himself or for another, under the act, by making or causing to be made false representations, shall be deemed guilty of a misdemeanor, and shall, upon conviction thereof, be liable to a penalty of not less than five and not exceeding one hundred dollars, and his name, together with the name of the person so registered, shall be stricken from the register.

SEC. 3726. Any person not a registered pharmacist as provided in this act who shall conduct a store, or a pharmacy, or place for retailing, compounding, or dispensing drugs, medicines, or chemicals, for medical use, or for compounding or dispensing physicians' prescriptions in the Territory of New Mexico, or who shall take, use, or exhibit the title of registered pharmacist, shall be deemed guilty of a misdemeanor, and, upon conviction thereof, be liable to a penalty of not less than five nor more than one hundred dollars: *Provided further*, This act shall not apply to physicians putting up their own prescriptions, nor to the sale of patent proprietary medicines, nor to the sale of those articles commonly known as grocers' drugs, except those articles that are denominated poisons under the law known as the New Mexico poison law; nor to any regularly licensed physician of the Territory of New Mexico engaged in the drug business in towns or cities situated twenty miles or more from a regular licensed pharmacist engaged in the drug business.

SEC. 3727. If any registered pharmacist shall go out of the drug business, and remain out for a period of twelve months, his certificate as registered pharmacist shall thereupon expire.

SEC. 3728. All suits for recovery of the several penalties prescribed in this act shall be prosecuted in the name of the Territory of New Mexico, in any court having jurisdiction, and it shall be the duty of the prosecuting attorney of the county where such offense is committed to prosecute all persons violating the provisions of this act upon proper complaint being made. All penalties collected under the provisions of this act shall inure to the expense fund of the board which may occur.

SEC. 3729. It shall be the duty of the said board to grant to persons or merchants in towns or camps having no drug store, minor certificates without charge, as they may deem proper, to vend such medicines, compounds, or chemicals as are required by the general public: *Provided*, That this law is not to be so construed as to prevent ranchmen or miners not within reach of a store or place where drugs are sold, from dispensing medicines to their families or employés: *Provided further*, That it shall be the duty of the secretary of said board to render an accurate annual statement to the governor of the Territory of all moneys received and expended by said board during each year, and he shall also report upon the general condition of pharmacy throughout the Territory.

SEC. 3730. The meetings of the pharmacy board shall be opened to registered pharmacists who shall be permitted to be present at the examination of applicants for registration.

SEC. 3731. Any member of the board of pharmacy who shall violate any of the provisions of this act, or who shall neglect or refuse to report any of the violations of the provisions of this act that may be within his knowledge, within ten days of the time said violation comes to his knowledge, shall be removed from office by the governor upon such showing as may be deemed satisfactory by the executive, and such vacancies shall be filled by the governor as now provided by law.

POISON LAW.

SEC. 1259. Every apothecary, druggist, or other person, who shall sell and deliver any arsenic, corrosive sublimate, prussic acid, or any other violent poison, without having the word "poison," and the true name written thereof, written or printed in Spanish and English, upon a label put upon the vial, box, or package that contains the same, shall be punished by a fine not exceeding one hundred dollars.

SEC. 1260. That hereafter it shall be unlawful for any person not a registered pharmacist to sell or dispense any poisons enumerated in Schedules A and B, except as approved by section fourteen of New Mexico pharmacy law, approved February 15, 1889. (Section 3726, Compiled Laws of 1897, quoted hereinbefore in pharmacy law.)

Schedule A.—Arsenic, mercury, strychnia, and their preparations of salts, acetate of lead, tartar emetic, cyanide of potassium, hydrocyanic acid, and all other poisonous vegetable alkaloids and their salts, essential oil of bitter almonds, opium and its preparations, except paragoric and such other preparations of opium containing less than two grains to the ounce.

Schedule B.—Aconite, belladonna, coca, colchicum, conium, nux vomica, henbane, savin, ergot, cotton root, cantharides, creosote, digitalis and their pharmaceutical preparations and alkaloids, croton oil, chloroform, chloral hydrate, sulphate of zinc, mineral acids, carbolic acid, and oxalic acid, without distinctly labeling the box, vessel, or paper in which the said poison is contained, with the name of the article, the word "poison," and the name and place of business of the seller; nor shall it be lawful for any person to sell or deliver any poison enumerated in Schedules A and B unless, upon due inquiry, it be found that the purchaser is aware of its poisonous character, and represents that it shall be used for a legitimate purpose; nor shall it be lawful for any registered pharmacists to sell or dispense any poisons enumerated in Schedules A and B without, before delivering the same to the purchaser, causing an entry to be made in a book kept for that purpose, stating the date of sale, the name and address of the purchaser, the name of the poison sold, the purpose for which it is represented by the purchaser to be required, and the name of the dispenser; such book to be always open for inspection by the proper authorities, and to be preserved for at least four years. The provisions of this act shall not apply to the dispensing of poisons in not unusual quantities or doses, upon the prescriptions of practitioners of medicine: *Provided*, Nothing in this act shall be so construed as to prevent the sale of such poisonous articles as are directly used in mining or for the reduction or concentration of ores.

SEC. 1261. Any person violating the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction shall be fined in a sum not exceeding one hundred dollars, or by imprisonment in the county jail for not more than six months, or both, in the discretion of the court.

SEC. 1262. All fines recovered under the provisions of this act shall be paid to the treasurer of the Territorial board of pharmacy.

SEC. 1263. It shall be unlawful for any person to keep or maintain a place for the purpose of furnishing opium to others, or what is commonly known as a hop joint or opium joint: *Provided, however*, That the provisions of this section shall not, in any wise, apply to druggists who may dispense or sell the same upon the prescription of a physician.

SEC. 1264. Any person violating the provisions of the preceding section shall be deemed guilty of a misdemeanor, and upon conviction thereof before a justice of the peace, or the district court, or any competent tribunal shall be fined in any sum not less than twenty-five dollars nor more than two hundred and fifty dollars, or he shall be sentenced to imprisonment at hard labor, in the county jail, for a term of not less than one nor more than six months, or both said fine and imprisonment, in the discretion of the court or jury trying the case.

SEC. 1265. All fines imposed under the provisions of this act, one half shall go to the prosecuting witness and the other half to the treasurer for the benefit of the school district wherein the offense was committed.

CAPITOL REBUILDING BOARD.

SANTA FE, N. MEX., *September 20, 1899.*

SIR: Pursuant to your request for a report from the capitol rebuilding board in regard to the rebuilding of the Territorial capitol, I have the honor, in behalf of the board, to respectfully report that the work is progressing satisfactorily, and that it is expected the building will be completed before the coming winter is ended. Many changes for the better have been made in the class of material used, and among such changes I may mention the framework of the dome has been constructed of steel instead of wood, the stairways of iron, and the corridors have been laid with mosaic tiling. Instead of using wood lath, we have used wire. These changes make the building fireproof to a great extent and will reduce the fire-insurance rate very much, besides making a more beautiful structure. We have been retarded in our work by delays occasioned in procuring material, especially the wood finish, owing to the fact that factories manufacturing the required material have at this time more than they can attend to, and have had for a long time past, and contractors will not bind themselves to deliver any material at all unless ample time is given.

Respectfully submitted.

F. A. MANZANARES, *President, etc.*

Hon. MIGUEL A. OTERO,
Governor of New Mexico.

BOARD OF EQUALIZATION.

SIR: The board of equalization appointed by you at the last session of the legislative assembly begs leave to report that it has just completed the duties of its first session, which were those of hearing appeals and equalizing taxes only, the fixing of values being for the January meeting.

We have been in session for a week, and considered all appeals presented from the different counties, some of them having been taken by the Territory from the action of the county boards, under the new law providing therefor.

We find generally an improvement in the manner of listing and valuing property, as well as an increase in valuation of about $1,000,000 over that of last year.

While the amendments to the revenue law passed by the last legislature have only been in operation a few months, their good effect is even now apparent, and we have every reason to believe that next year will prove their very substantial value.

Very respectfully,

JAMES S. DUNCAN, *President.*
JOHN W. POE,
NUMA RAYMOND,
ALEJANDRO SANDOVAL,
Members of the Board of Equalization.
V. JARAMILLO, *Secretary.*

Hon. MIGUEL A. OTERO,
Governor of New Mexico.

TERRITORIAL LIBRARIAN.

I have the honor to submit the following report of the condition of the Territorial library at the present time:

The affairs of the Territorial library are controlled by a library board of trustees. This board is now composed of the following gentlemen: Hon. John R. McFie, ex officio chairman of the board, and the Hons. T. B. Catron and H. L. Waldo. The board has made the following additions to the library since I took charge of the same: Indiana Reports, 168 volumes; Iowa Reports, 91 volumes; Kansas Reports, 58 volumes; Kentucky Reports, 73 volumes; Maine Reports, 80 volumes; Michigan Reports, 103 volumes; New York Reports, 373 volumes; Pennsylvania Reports, 220 volumes; Texas Reports, 120 volumes; Vermont Reports, 23 volumes; one complete set of Session and Compiled Laws of New Mexico, from 1851 to 1893, 39 volumes; Century Dictionary (including Dictionary of Names), 7 volumes; Spanish-English Dictionary, Lopez and Bensley, 1 volume; Federal Cases, with Index, 31 volumes; Circuit Court Reports, 54 volumes; besides a number of volumes to fill up incomplete sets of some of the States' supreme court reports.

By the addition of the above-named volumes the library has been placed in

excellent condition, as nearly all the States are represented, but it is far from complete. New text-books are needed. Such of these as we have are old and out of date. Such as it is, the library has been very useful to the courts.

The usual system of exchange has been maintained with the libraries of the different States, and we are continually receiving from them their publications. In exchange for this courtesy we have sent them the session laws of the last legislature, the New Mexico Reports and the Compiled Laws of 1897.

In pursuance of Chapter XXXII of the Laws of New Mexico, 1895, volumes 3, 4, 5, 6, 7, and 8 of the New Mexico Reports were published. The Territory purchased from the publishing house, at $3 per volume, 300 of each of these volumes and the library board of trustees purchased 100 of each. These books were delivered by the publishers at the Territorial library. About 80 copies of each of the above-named volumes have been distributed to State libraries, judges Supreme Court United States, judges supreme court New Mexico, Attorney-General United States, and to such persons and institutions as are designated by law. The remaining volumes are kept in the library.

Under the act of 1897 for the compilation of the laws of New Mexico, the public printer delivered at the library 500 volumes of said compiled laws in the Spanish language and 1,500 volumes in the English language. Of this number 136 copies, as authorized by law, were delivered to the secretary of the Territory for distribution to State libraries and members of the last legislature. I have delivered on orders of the Territorial treasurer the following number of volumes by him sold, as directed by law, at $8.50 per volume: English volumes, 144; Spanish, 87; total number of volumes sold, 231, yielding to the Territory the sum of $1,963.50.

The total number of volumes in the Territorial library is about 5,000. Over one-half of this number is made up of law books, the remainder consisting of State documents, executiv edocuments, patent reports, pamphlets, and miscellaneous books. It is a very valuable property to the Territory, and the board of trustees, as a guard against contingencies, has insured the same for $10,000, as follows: Five thousand dollars in the Royal Insurance Company of Liverpool and $5,000 in the American Central Insurance Company, of St. Louis.

The condition of the Spanish archives is not what it should be. Laid in ordinary shelves, they are exposed to the action of air and dust. These and the constant handling by many people eager to peruse their contents cause demolition, and they are fast crumbling away. Provision should be made for the preserva- of these archives, as they are very valuable from a historical point of view. Last fall Prof. Elliott Coues, of Washington, D. C., devoted some time in research here among these archives, and in his perusal of the different packages he came across fractions of that important historical document known as the "De Vargas Journal." These fractions were all put together, including others collected before, and the journal forms now one single batch of 100 folios dated 1693. I regret to say that a number of pages of this document are crumbling away, and still others are illegible. These papers, if lost or destroyed, can never be replaced, and a vast fund of historical data will be lost to the future historian. The oldest set of papers in the Territorial library is made up of one folio dated 1664, in which appears the only genuine signature known to exist in this country of the famous Count de Penalosa; another folio dated 1636, and a third batch consisting of six folios dated 1621. These papers are in a remarkably good state of preservation. I respectfully suggest that the legislature may adopt some measure which will preserve to the Territory forever the Spanish archives.

LAFAYETTE EMMETT,
Territorial Librarian.

ST. VINCENT HOSPITAL,
Santa Fe., N. Mex., June 30, 1899.

DEAR SIR: In compliance with your request, I herewith submit to your excellency the following report of St. Vincent's Hospital and Orphans Home for the year ended March 4, 1899.

The hospital is open to all the afflicted, and patients are admitted regardless of nationality or religion.

We appreciate the appropriation made to us by the Territory of New Mexico for conducting our institutions in this city, but a reference to the receipts and expenditures will convey the proof that the appropriation of $4,000 does not entirely cover the expenses of the hospital, for in excess of the appropriation the expenses amount to $737.10, which was met by a donation from the sanitarium and $114.10 from the miners' collection in Cerrillos.

Apart from the actual cost of supplies furnished the inmates, other necessaries in connection with an institution of this kind must be considered, such as bandages, towels, bed linen, blankets, dishes, etc., all of which must be replaced from

time to time and for which purpose the Territory does not allow me to use one dollar of the appropriation. The bedding is no small item to be considered, for it must be destroyed to prevent contagion.

The hospital is attended by Drs. Sloan and Massie, who give their services free of charge, and their ever-ready response to all of the many calls made upon them has in a large manner insured our success. The Sisters appreciate, and take this opportunity to thank them for, their many courtesies and kind attention to the poor in the hospital.

Three of the Sisters devote their entire time and attention to the care and comfort of the sick in the hospital wards without compensation.

The Territory of New Mexico is indebted to us in back payments on appropriations to the amount of $13,000, and I deem it a great injustice that no provision was made by the last legislature to pay this deficiency, which, in justice to the Sisters, should have been done. Most certainly a lack of appreciation and interest for the welfare of the institution is shown, and it was far from honorable and just in those who should have done their duty in this matter.

Last January a statement from the auditor was received by me, showing the entire indebtedness to amount to a deficiency of $5,163.65 on the hospital account from the forty-fifth up to and including the forty-ninth fiscal year. Dating from the same time is $8,253.33 on the orphans' account, making the total indebtedness $13,416.98. These claims were the only ones not considered when provision was made to pay all deficiencies by the last legislature.

Referring to the report of St. Vincent's Orphan Home, I have to say: During the past year there was one death, caused by pneumonia. Otherwise the health of the children is excellent.

At the close of the forty-ninth fiscal year there were 32 children in the institution, a large majority being of Mexican parentage. The children are taught all kinds of housework, and in connection therewith the rudiments of a common-school education. They have class hours week days from 9 a. m. to 12 and from 1.30 p. m. to 4 p. m. One afternoon in each week is devoted to sewing. An apparent appreciation of the advantages which the orphans' school at Santa Fe offers to the poor children of the Territory is manifested by them.

Respectfully,

SISTER EULALIA, *Superior.*

Hon. M. A. OTERO,
Governor of New Mexico.

Report of St. Vincent's Hospital from March 7, 1898, to March 4, 1899.

SUPPLIES PURCHASED DURING THE YEAR, AND COST OF SAME.

Articles.	March.	April.	May.	June.	July.	August.	September.
Groceries	$98.42	$176.71	$159.53	$277.99	$199.08	$249.44	$196.75
Meat	72.00	70.50	76.90	70.00	74.00	76.85	40.00
Feed for cows	8.00	.....	20.00	13.75	9.00	27.20	.....
Tea and coffee	.....	.....	.....	.....	41.00	.....	49.75
Drugs	25.66	17.90	18.10	8.28	9.45	12.95	12.40
Water	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Bread	26.66	26.66	26.66	26.66	24.20	33.33	26.66
Coal and freight	.....	73.30	11.50	.....	.....	.....	63.80
Coal oil	10.50	5.25	5.25	5.25	5.25	10.50	10.50
Butter	19.60	18.38	22.57	15.12	34.74	41.06	19.63
Pauper burials	6.25	.....	6.25	6.25	6.25	6.25	6.25
Total	277.18	398.70	356.76	433.30	412.97	467.58	435.74

Articles.	October.	November.	December.	January.	February.	Total.
Groceries	$210.95	$211.21	$126.74	$123.51	$124.10	$2,154.43
Meat	50.60	30.00	40.00	70.00	75.00	745.85
Feed for cows	31.50	.....	44.98	10.00	54.12	218.65
Tea and coffee	.....	.....	.....	.....	.....	90.75
Drugs	20.00	19.80	11.00	16.75	28.30	200.59
Water	10.00	10.00	10.00	10.00	10.00	120.00
Bread	33.63	22.73	26.00	24.75	26.00	323.94
Coal and freight	.....	71.92	68.40	77.00	78.43	443.35
Coal oil	10.50	10.50	10.50	10.50	10.50	105.00
Butter	20.68	23.04	22.40	20.39	20.50	278.29
Pauper burials	6.25	.....	.....	12.50	.....	56.25
Total	394.11	399.20	360.02	374.50	427.04	4,737.10

The present population of the county is estimated at 35,000, one-third of which is within a radius of 5 miles from the court-house in the city of Albuquerque.

An act was passed by the last legislature providing for the creation of a new county out of a portion of the western end of Bernalillo, to be known as "McKinley County," but the law has not yet gone into effect.

The county presents a great diversity of topography and climate. There are several detached mountain ranges, having altitudes as great as 12,000 feet above sea level, large areas of high mesas or table-lands, with altitudes varying from 6,000 to 9,000 feet, and valleys ranging from 4,000 to 6,000 feet.

CHIEF INDUSTRIES.

The principal industry at present in the mountain districts is mining, though grazing is carried on to some extent, especially in the timbered sections of the mountains, and during the winter season, as there is rarely snow enough, except near the top, to cover the grass, and the trees and brush furnish the animals a good measure of protection against the severe winds, which sometimes sweep over the mesas at that season. There is also a little farming done in the canyons, though in a very small way, the principal crops being potatoes, beans, and chili, and some wheat and oats. The mountain sides, when not too steep or broken, are found to be excellent fruit lands, and the crop is more reliable there than in the valleys, because less liable to injury from late frosts in the spring. Apples, especially the winter varieties, do better in the mountains than elsewhere, and it is believed by many that fruit growing on the mountain slopes will become in time a very important industry. In nearly all the mountain districts the rainfall during the growing season is sufficient to produce crops without irrigation.

The mesas or table-lands are usually long stretches of plain, varying in width from 5 to 20 miles, and extending from the base of the mountains in the direction of the valley, with an inclination of only a few feet to the mile, and ending abruptly in a range of bluffs or sand hills, which form a background of brown for the verdure of the valley. These mesas are the principal grazing districts. In seasons of average rainfall the grass grows abundantly, and owing to its peculiar character it "cures" on the ground during the fall, and instead of "washing out" and becoming valueless, like the ordinary prairie grass, it is like hay and makes almost as good feed in the winter as in the summer. These plains are dotted at all times of the year with herds of cattle and flocks of sheep. During the summer and fall the animals have to be "held" comparatively near the springs or water holes, because cattle have to range where they can go to water during the warm weather once a day and sheep at least once in two days, but after the weather gets cool and a little snow falls on the grass the animals, especially the sheep, can go a long time without drinking, and this gives them practically a fresh field in the winter, because it enables them to range over sections that they could not reach in the summer because of the distance from water, and water in New Mexico is with the ranchman, as with the farmer, the first consideration.

IRRIGATION.

By the construction of storage reservoirs in the mountain canyons to catch the storm waters which come down in great volumes during the rainy season, in July and August, and to conserve the waters of

Report of St. Vincent's Orphan Home and Industrial School for the forty-ninth fiscal year, ended March 4, 1899.

Number of children in orphanage March 6, 1898	34
Number of children received during the year	30
Number of children taken out by relatives during the year	31
Number of deaths during the year	1
Number of children remaining in orphanage March 4, 1899	32

FINANCIAL STATEMENT.

Receipts.		Expenditures.	
From Territorial appropriation	$3,266.09	Groceries and bread	$1,550.65
From friends and children's relatives	183.20	Meat	720.40
From sanitarium resources	293.70	Milk and butter	450.80
Balance due on appropriation of $4,000	733.91	Drugs	65.00
		Dry goods	405.00
		Shoes	350.50
		Mending shoes	80.40
		Hose	102.60
		Hats and trimmings	50.75
		Coal and freight	425.90
		Coal oil	60.80
		Schoolbooks and slates	75.65
		Writing material and stamps	15.30
		Shoe polish and laces	14.25
		Laundry soap	53.00
		Toilet soap, combs, and brushes	25.90
		Wood	80.00
Total	4,476.90	Total	4,476.90

COUNTIES.

There are now 20 counties in the Territory of New Mexico, which are as follows:

NORTHERN TIER.

Colfax; county seat, Springer. Taos; county seat, Taos. Rio Arriba; county seat, Tierra Amarilla. San Juan; county seat, Aztec. Union; county seat, Clayton.

CENTRAL GROUP.

Mora; county seat, Mora. San Miguel; county seat, Las Vegas. Santa Fe; county seat, Santa Fe. McKinley; county seat, Gallup. Bernalillo; county seat, Albuquerque. Valencia; county seat, Los Lunas. Socorro; county seat, Socorro. Sierra; county seat, Hillsboro. Guadaloupe; county seat, Puerto de Luna.

SOUTHERN TIER.

Lincoln; county seat, Lincoln. Donna Ana; county seat, Las Cruces. Grant; county seat, Silver City. Eddy; county seat, Carlsbad. Otero; county seat, Alamogordo. Chaves; county seat, Roswell.

BERNALILLO COUNTY.

Bernalillo is one of the largest counties in New Mexico, both in area and population. It is of irregular shape, about 200 miles long from east to west, with an average width of 50 miles from north to south, containing a little over 10,000 square miles, being larger than any of the New England States except Maine.

rience as the owner of a farm in the Rio Grande Valley in Bernalillo County, contributed an article to a recent publication by the bureau of immigration of this Territory, in which he took the ground that 10 acres of the valley land of this county, cultivated under irrigation, could be made to bring the owner a larger net cash return every year than could be realized from a quarter section in any of the grain-growing States, and he sustained his position by facts and figures drawn from actual experience. Detailing the manner in which the result mentioned can be achieved, the writer says:

Sweet potatoes of most excellent quality yield abundantly in the soil of this valley, and do not require to be irrigated as often as most other crops, thus saving the farmer much labor. Both soil and climate seem to be peculiarly adapted to their growth, and the quality of the product is fully equal to the famous sweet potatoes of New Jersey, while a fair average crop will give from 900 to 1,000 bushels to the acre. They never sell in the fall for less than $1 a bushel, and those that are kept into the winter usually bring as much as $2. From this it will be seen that 1 acre cultivated in sweet potatoes in Bernalillo County will bring the farmer as much money as he could hope to realize from 80 acres in corn or wheat, in any of the grain-growing States, in a good year, and since the result is to be measured by dollars and not by acres, it will be seen that the irrigation farmer, although he may not be able to cultivate fields as broad as those of his neighbor in the "rain belt," has a better chance of success, and a decidedly better prospect of a balance to his credit in the bank at the end of the year,

The onion is another product that seems to be peculiarly adapted to this section of the country. The large white Spanish onions, which grow to greater perfection in New Mexico than anywhere else in the United States, afford one of the most profitable crops that can be grown in this county, and is also one that can be brought to perfection only under irrigation. On account of its beautiful silvery color and its peculiar mild flavor this onion finds ready sale in any part of the country, and always commands the highest price. The yield is about 500 bushels to the acre, and the price at home ranges from $1 a bushel in the fall to $3 a bushel in the winter and spring.

Celery and asparagus are also articles which are especially adapted to the soil and climate of this county, and attain here a degree of excellence but rarely found in such articles grown elsewhere. The celery is far superior to that grown in California, and is pronounced by all who try it fully as good in all respects as the Kalamazoo product, which is noted throughout the country for its superior quality. All the eating houses and dining cars on the western divisions of the Santa Fe Railway system now draw their supplies of celery from the gardens of Bernalillo County, whereas a few years ago they obtained such supplies from Michigan and California. And when it comes to asparagus this section can fairly claim to "beat the world," for nowhere else on the American continent is there produced asparagus which can at all compare with that grown in the valley of the Rio Grande. In many places in the valley there are large quantities of a salt which goes under the common name of "alkali," and which, though deleterious to some kinds of vegetables, is one of the favorite foods of asparagus, and does away with the necessity of applying salt to the ground, as is the custom wherever asparagus is grown in the Eastern or Middle States. It also causes the plant to attain in this section a degree of excellence in tenderness and flavor which is unknown in that grown elsewhere. During April and May, the months when the cutting is done, the shoots will attain, under favorable conditions a growth of about 6 inches a day, every particle of which is edible; there is no woody portion to be thrown away; the whole stock is soft and tender, and the flavor is proportionately superior. Sample lots of asparagus from this section have been sent to many parts of the country, and the verdict is always the same—"the best I ever tasted." Experience has shown that it will bear shipment to Portland, Me., and that is as far away from New Mexico as one can get in the United States, so it will be seen the whole country is open to us as a market, and that the article can be sold wherever introduced goes without saying, for it sells itself. An asparagus bed of 1 acre will yield, after the third year, about 200 pounds a day for sixty days in the year (which is as long as it is wise to cut it), and this will bring an average price of 10 cents a pound.

Thus, with 1 acre each of sweet potatoes, celery, onions, and asparagus, a man can make a good estimate of the money value of the crop that he will have for market each year. And in addition to this he will need 2 acres in alfalfa, and 2 in corn or oats for his cow and horse, and 2 for house lot, orchard, and kitchen

garden. That makes 10 acres in all, and is as much land as any man needs in this section to farm for profit, while it is as much as the most industrious man can properly cultivate in the crops named. There is an abundance of good land for such purposes to be had in this county at fair prices, and with good facilities for irrigating, such as are now being provided, there will be room here in this line of business for at least a thousand families, convenient to as good a market as there is anywhere in the West.

GALLUP.

The great industry of New Mexico for centuries to come will be mining. The many mountain chains and detached ranges which are found in every part of the Territory are all seamed with mineral-bearing veins. In the mountains of this county there are workable veins of gold, silver, copper, lead, and coal. The principal coal-mining industry of the Territory is carried on at Gallup, in the western part of the county, about 15 miles from the Arizona line. Gallup is a town of about 2,500 people, and is the second town of the county in size and importance. It has good public schools and churches, and an enterprising weekly newspaper, and while strictly a coal-mining town is as orderly a place as will be found in any part of the country, East or West. There has been but little done in the immediate vicinity in the way of agricultural development, by reason of the scarcity of water for irrigation, but the soil is very rich, and wherever it can be cultivated yields abundant crops. The town is situated in the valley of the Rio Puerco of the West, on the Pacific slope, just west of the Continental Divide, and at an altitude of about 6,500 feet above sea level, which gives it a delightful climate, especially in summer. The Zuñi Mountains, a few miles south of the town, contain the most extensive forests of pine timber now to be found in any part of the United States south of Minnesota. The most of this timber is on public land or on land owned by the railroad company, but owing to the distance from any railroad but little of it has yet been utilized.

Gallup is on the Santa Fe Pacific Railway, a division of the main line of the Atchison, Topeka and Santa Fe, and is the principal town on that line between Albuquerque and Los Angeles. It furnishes regular employment in its coal mines to about 600 men, and its annual output exceeds 300,000 tons, or nearly one-half the total coal output of the entire Territory. The bulk of this is delivered to the railway company, and furnishes all the fuel used by the company between the Rio Grande and the Pacific Ocean. The operators here also send large quantities of "commercial" coal to Los Angeles and other southern California points, to Phenix, Tucson, and other places in Arizona, while many thousands of tons come east to Albuquerque, and are sent south into Texas and old Mexico. The coal is a lignite, excellent for steam and domestic purposes, burning without any clinker, and leaving but little ash, though it will not coke, and is not a desirable coal for gas making. There are five known workable veins, one above another, the lowest at a depth of less than 100 feet. The field extends to an unknown distance to the north and west of the town, and is considered practically inexhaustible. The first work in the development of this field was done in 1881, but the industry did not assume important proportions till 1884, so that it can be said to be now about fifteen years old.

This is the only important industry yet developed in the western part of the county. The country is well adapted to grazing purposes, but the most of it is embraced in the reservation of the Navajo Indians, and the flocks of this tribe graze over all the reservation and

also the adjoining lands for several miles on either side. The treaty with the Navajos requires them to keep their people and their animals within the limits of their reservation, but this provision has never been enforced.

BLAND.

The town of Bland, in the northeastern part of the county, about 50 miles by the road from Albuquerque, is also a mining town, but the work at this point is confined to mining the precious metals. The town is the center of the famous Cochiti mining country, now well known as one of the most extensive and productive of New Mexico's many mining camps. It is situated in Pino Canyon, about 10 miles from the Rio Grande, and is surrounded on all sides by a rich mineral country. It was founded about five years ago, and has a population estimated at 1,000. The nearest railway point is at Thornton, on the main line of the Atchison, Topeka, and Santa Fe, about 18 miles distant, but a stage line furnishes comfortable transportation for passengers and a daily mail. The same coaches continue up the canyon from Bland, and across the mountain to Sulphur Springs, a well-known health resort, where the waters have been found to possess highly valuable medicinal qualities. The ores of the Cochiti camp are chiefly valuable for their gold. They are usually of low grade, but are of a character that can be worked in the camp. This, taken in connection with the fact that they are found in immense bodies, and are also very evenly mineralized, makes mining at Cochiti profitable and reliable.

In a description of this camp, a writer who recently visited the place says the Washington, Lone Star, and Crown Point mines are in the immediate vicinity of the town of Bland. It is estimated that there are 50,000 tons of ore on the "dump" of the Washington mine at the present time, worth $28 a ton. The property is in litigation at present and is not being worked. The Lone Star has a vein of rich sulphides, varying from 30 to 75 feet in width, and running perpendicularly up the mountain side. This vein has been worked steadily for the last two years, and there is now enough ore "in sight" to keep a mill with a capacity of 100 tons a day running for four years. Lying parallel with this vein, and only a short distance from it, is another which has not yet been touched. It is the intention of the company owning this property to put up during the coming year a mill for the treatment of their ores with a capacity of 100 tons a day. The site has been selected, and arrangements have been made for the construction of the mill. The mill at present in use is small, having a capacity of only 25 tons a day.

The Albemarle property, upon which more work is being done now than upon any other in the district, is only about 3 miles from Bland, but it is in another canyon, and hence the mountain has to be crossed in order to reach it. The road has a grade of 1,500 feet to the mile, but it is the best route than can be found, and over it, up one side of the mountain and down the other, have to be hauled not only all the products of the mine, but all the supplies for the camp. The mine is in a canyon not over 60 feet wide at the bottom, and room was made for the mill by blasting out space in the wall of the chasm, so that the buildings themselves appear to be a part of the mountain. The 250-horsepower engine and all the immense machinery for the mill were transported over the road above mentioned. The present mill has a capacity of 110 tons a day, and another of equal capacity is now

in course of construction. The works now give employment to about 250 men, and that number will be nearly doubled when the new mill is completed. The difficulty of procuring fuel has determined the company to substitute electricity for steam power, and works for this purpose are now being constructed at the Cerrillos coal fields, in Santa Fe County, about 20 miles distant, from which point the current will be transmitted to the mill.

This is the largest mining enterprise in the county, and there is none larger in the Territory, but a good idea can be formed of the extent and richness of the Cochiti mineral field from the fact that there is room for at least a dozen more, of equal capacity, and ore enough to keep them all running full handed for at least a quarter of a century, and probably much longer. A railroad from some point on the Atchison, Topeka and Santa Fe to Bland is much needed, and if such a line were built, so that ores could be shipped out at moderate expense, reduction works sufficient to handle the output of the camp would probably be built along the Rio Grande, where the river would furnish a sufficient water supply, the lack of which is now one of the greatest obstacles in the way of the prosperity of the camp, and where the advantage of water power could also be had. This would greatly facilitate the development of the camp, since the small operators, who are unable to put up mills of their own, would thus be given a market for their ores.

OTHER CAMPS.

There are several other mining camps in the county, though the most of them have so far been unable to send much ore to market, owing to the undeveloped state of their mines. Prominent among these may be mentioned Hell Canyon, Coyote Canyon, Las Placitas, San Isidro, and Copper City. The last two named are copper camps and the others gold and silver. They all have rich leads and lack only development to make them good and profitable metal producers, but it requires a considerable amount of capital to transform a "prospect" into a producing mine, and capital in sufficient amounts to be of value for such purposes is very rarely, if ever, found among prospectors. In some of the camps named, especially Hell Canyon, considerable development has been done, and the work in every case has justified the estimates which the owners put upon the property. In the course of time, when men with money enough to make mines of these claims take hold of them, all the camps referred to will become prosperous mining districts. There is a large copper field at Copper City, and it has been worked some in years past, but it is so far from the railway and the product and supplies have to be hauled so far over a difficult road that operations in the camp can not be carried on with profit, even at the high price of copper now prevailing. At San Isidro some work is now being done, and the prospects are very encouraging. This is much more accessible than the Copper City camp, and it is believed that the ore can be hauled out and shipped at a profit, as it is not more than 25 miles from the line of the railway.

SUMMER RESORTS.

Some of the most delightful and enjoyable summer resorts in the Southwest are in the mountains of this county, and readily accessible from the towns. The Jemez Hot Springs, now well known and popular as a health and pleasure resort, is in the canyon of the Jemez River,

also the adjoining lands for several miles on either side. The treaty with the Navajos requires them to keep their people and their animals within the limits of their reservation, but this provision has never been enforced.

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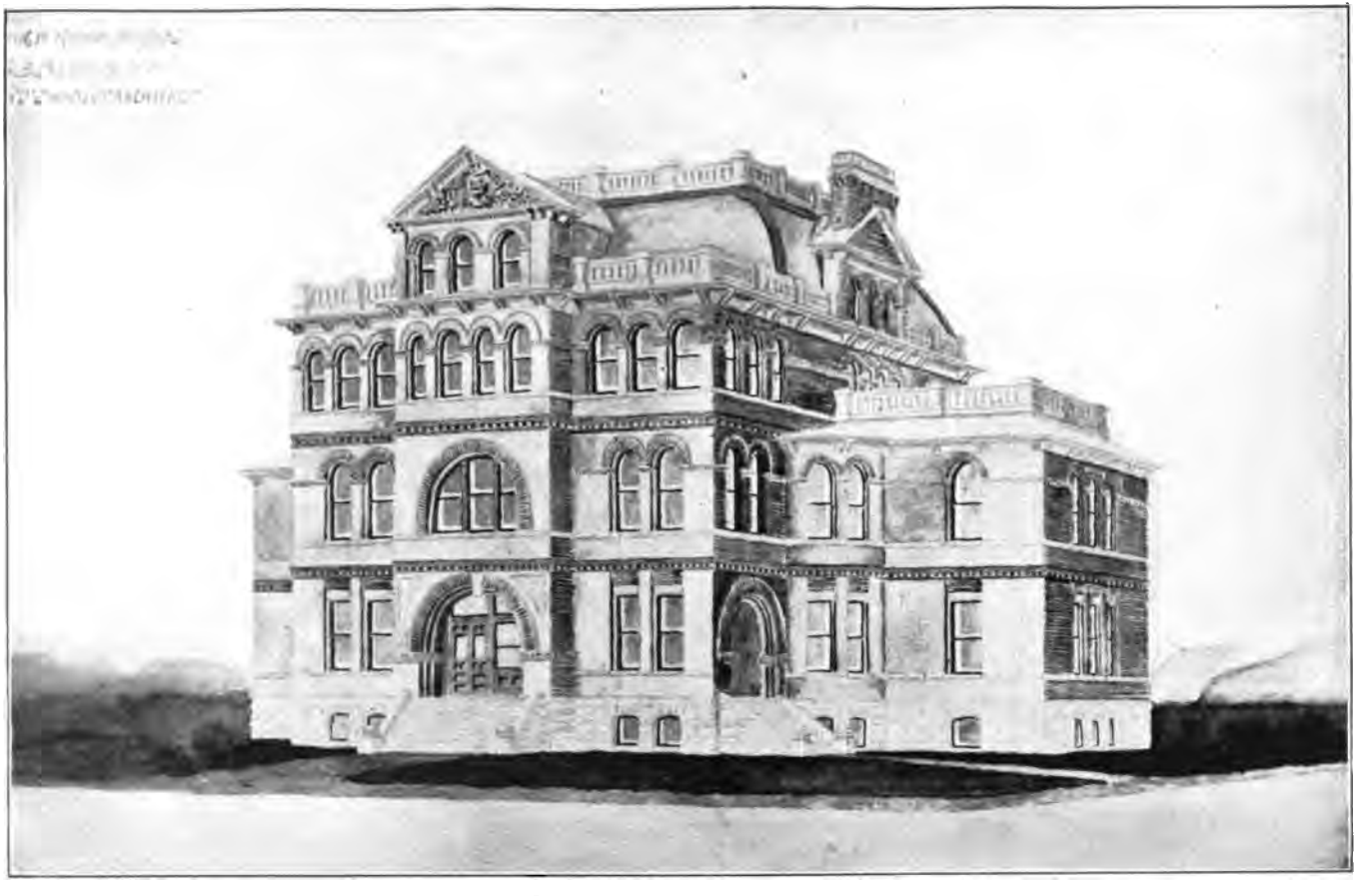
PUBLIC SCHOOL - ALBUQUERQUE

twelve hours' ride from Albuquerque by stage, and the Sulphur Springs, to which reference has been made elsewhere, are situated about 10 miles farther up in the same canyon. Both these places are well-known resorts, and their reputation extends beyond the limits of the Territory. They are visited annually by many persons in search of health, and the waters are said to have a very salutary effect in nearly all cases. They are especially valuable to those afflicted with scrofulous disorders or rheumatism, and it frequently happens that rheumatic patients who have to be carried there on their beds appear to be restored to perfect health after a sojourn of a few weeks. These places are also popular pleasure resorts in summer, because the weather is rarely too warm for comfort, and there is excellent hunting and trout fishing.

Camp Whitcomb, in the Sandia Mountains, 17 miles east of Albuquerque, is also a very popular summer resort for people from the city. It is reached by a good road, through a very interesting portion of the country, and the trip can be made from town to the "Camp" with a carriage in about three hours. The place is situated high up on the mountain side in the pine woods, and its convenience to the city, as well as the beautiful scenery, the cool and bracing atmosphere, and the abundance of pure mountain water from numerous large springs, combine to make it a very attractive warm-weather resort, and it is visited by the people from the city in large numbers throughout the season. There are a score of other good natural resorts in the county, but as they are without accommodations for the public, they are visited only by those who can go prepared to "camp out," and most of the older residents of the country prefer this style of entertainment to the hotel or public house; hence, a large number of families in the city spend their summer vacation in camp in some favorite mountain canyon where they can have all the attractions of nature in her wildest moods, and yet be not so far removed from civilization but that the city can be reached in a few hours if necessary.

ALBUQUERQUE.

The county seat of Bernalillo County is Albuquerque, the largest city in the Territory and the commercial center of all that portion of New Mexico south and west of the Glorieta Mountains, embracing about three-fourths of the Territory, and also of the northern half of Arizona. Its merchants cover an undisputed trade area of about 100,000 square miles, or a district larger than the six New England States and the State of New York combined, which give the place a wholesale trade much larger than is done by many Eastern cities of three times its population. The present population of the place is about 12,000, about one-fourth of whom are natives of the Territory, and the remainder immigrants from the "States," coming from nearly all the States of the Union. There is not a more cosmopolitan city in the United States than Albuquerque, and the peculiarly American quality of "get there" is very distinctly in evidence on every hand. The importance of the position which this place occupies with reference to the business affairs of New Mexico and Arizona can be best illustrated by the fact that the United States Post-Office Department has made it the postal headquarters for the Southwest, and the post-office here is the depository for all the offices in both the Territories. The free-delivery system was inaugurated about ten years ago, and mail is delivered twice a day in all parts of the city and once a day



PUBLIC SCHOOL, ALBUQUERQUE.

COMMERCIAL CLUB, ALBUQUERQUE.

in the suburbs. It is also the most important point on the line of the Atchison, Topeka and Santa Fe Railway between Topeka and Los Angeles.

Many Eastern people imagine that in coming "away out to New Mexico" they would put themselves entirely beyond the pale of civilization, and for the benefit of such it may be said that they would find Albuquerque fully abreast with any Eastern city of double its size in everything that goes to make up the modern, progressive, American town—not even excepting those things that might better be left out, but which, like the buzzards, always gather where the carcass is. The town has a fine system of public schools with a large and elegant school building in each ward. There are in addition a number of good private schools, while denominational institutions are maintained by the Methodists, Presbyterians, and Catholics. It is also the seat of the University of New Mexico, established and maintained by the Territory, and endowed by the United States with a liberal donation of public land. The university building is located upon an eminence about 200 feet above the general level of the town, with an unobstructed view for many miles in every direction. With the Sandia Mountains 12 miles east for a background, the view takes in the Jemez Mountains, 60 miles north, the San Mateos, 70 miles west, and the Socorros and Magdalenas, 75 miles south, while with a glass may be seen the Mogollons, more than 125 miles to the southwest. The institution has a first-class faculty and ranks among the best Western colleges. A new building is now in course of erection, in which will be established a department that will be unique in its way, being the only one of its kind in the United States, and to be devoted to the study of climatology, with special reference to the effects of climatic conditions in the cure or prevention of disease, particularly diseases of the lungs. Mrs. Alice P. Hadley made the university a donation of $10,000 for this purpose on condition that a like sum would be contributed by the people of the Territory, whereupon the legislature appropriated $5,000 and the people of Albuquerque raised the remainder. The department will be known as "Hadley Hall," in memory of the late Walter C. Hadley.

In the matter of religious advantages the town is very thoroughly equipped. All the leading Christian denominations have societies here, with good, commodious houses of worship in which services are held regularly, and a Jewish society, organized some years ago, is now building a synagogue.

There are commodious places of public entertainment and amusement in which are given lectures, operas, theatrical entertainments, etc., and during the entertainment season the people of the place are never at a loss for "some place to go."

One of the institutions of Albuquerque worthy of special notice is the "Commercial Club." This represents a successful combination of business and social interests, and possesses within the one organization all the principal features of a chamber of commerce and a social club. To the active and effective work of this organization as a general "push committee" is attributed much of the prosperity which has been enjoyed by the town during the last ten years. It is quartered in its own building, erected especially for the purpose at a cost of $75,000, a large and elegant structure of red sandstone, and which is pronounced by visitors as fine a clubhouse as any west of Chicago.

The principal shops of the Atchison, Topeka and Santa Fe Railway

west of Topeka are located here and furnish regular employment to some 600 men. These shops are being steadily enlarged, and it is said to be the intention of the company to have all of its work done here for all of that portion of its system west of the western line of Kansas, which will render necessary the employment at this place of about 1,200 men.

There is an excellent system of waterworks, furnishing the purest of water in great abundance, both for domestic use and for lawn irrigation, and at very low rates. Light is furnished by gas works and an electric-light plant, the streets being lighted by electricity.

All the streets are graded, and most of them are paved with a natural cement obtained from the neighboring hills, and laid upon a foundation of cobblestones, making a thoroughfare very firm, smooth, and durable. Excellent sidewalks line all the principal streets of the place, the popular material for this purpose being an artificial stone made of sand and Portland cement upon a foundation of gravel. This makes a walk as hard and smooth as natural stone, and apparently quite as durable.

The manufacturing interests of the town, in addition to the railway works above named, are represented by a foundry and machine shop, which turns out large quantities of work, especially for the many mining camps in various parts of the Territory; a brewery and two ice factories, which ship their products to all parts of Mexico and west to the California line; two flouring mills, two mineral-water establishments, a planing mill, four brickyards, a cigar factory, a broom factory, and many smaller establishments.

There is an excellent opening here for a canning factory, to handle the fruits and vegetables which are grown in great abundance in this vicinity, and a beet-sugar factory.

Nearly all lines of business, commercial, mechanical, and professional, are represented in Albuquerque, and it has, in addition, a considerable population composed of persons not engaged in any active business, who seek the mild, dry atmosphere of this section, especially during the winter season, for health or pleasure.

There are two daily papers in the town, one issued in the morning and the other in the evening; five weekly papers, and one monthly publication, the last named being devoted to the interests of the mining industry. The town also possesses the largest and best free public library in the southwest, which is maintained by a special tax levied by the city council for that purpose.

CHAVES COUNTY.

In point of natural resources from which are rapidly being developed conditions that are soon to support a prosperous, wealthy people, Chaves is the banner county of New Mexico.

As originally organized in 1899 from a portion of the county of Lincoln, it was approximately 100 miles from north to south and 110 miles from east to west. The legislature of 1899 added territory on the southwest about 36 miles square. The greater part of this large area is grazing land, pure and simple, excellent grass lands which sustain thousands of cattle and sheep the year round and which, with the further development of water, which is quite practicable, will sustain even more. A great deal of the range area is held by cattle owners who have title, in many instances, to land on which are found springs and lakes, or on which they have dug or bored wells and put up wind-

mills and, owning these improvements, are able to control, in a manner, the range contiguous. But there are large areas of grass lands on which no water is found during a very dry season, and it is in such localities that the development of water is most important, since without water the range, although covered with the best of feed, is practically well-nigh valueless. To this matter, the finding of a water supply, a great deal of attention is being devoted, at a heavy expense in some cases. Large well-boring machines, worked by gasoline engines, are being used, and the work is being carried on, slowly but surely, by men of means who understand the importance of procuring an adequate supply of water. The open-range stock interests were the original mainstay of the county and continue to be the most important in point of tax-paying ability. But the glory of Chaves County, at least at present, is the magnificent alfalfa farms with their herds of fine cattle—Herefords and Shorthorns—and their flocks of Shropshire sheep. Two large farms, one of 1,000 acres and another comprising 13,000 acres in both alfalfa and natural-grass pastures, are devoted exclusively to the Hereford industry, and have on them as fine animals as could be purchased from some of the leading breeders of registered Herefords in the United States. In fact the owners of these farms have among their fine stock many prominent prize winners. The owner of Sir Bredwell, who paid $5,000 for him, has lately purchased a 500-acre alfalfa farm 2 miles east of Roswell at a cost of $25,000, and will spend thousands of dollars making it a model Hereford home. The two farms referred to above are a surprise and delight to all who see them and the fine stock on them. Chaves County will soon be known as one of the most prominent, successful Hereford breeding grounds in the United States. The pioneers in the industry here are men of ample means who have "set their mark high" and whose dictionary does not contain the word "fail." Their friendly emulation and that of others to follow will result in a few years in placing Chaves County in the front rank of fine whiteface breeding centers. The breeders of Herefords at present are devoting their attention largely to the raising of young bulls. The home demand—the range-cattle owners—has so far taken all that could be raised. Inquiries are being made by large cattle owners from Old Mexico for young bulls with which to improve their herds, and they will be good customers.

Meanwhile the old "standby," the Shorthorn, is not being neglected. There are three herds of 400 to 500 each, two of which are being bred straight, while the other, some 500 Durham cows, are being crossed with Hereford bulls. These herds are also owned by men who are able to breed the best and will do so. The result will be watched with interest.

For the breeding of both Herefords and Shorthorns in the arid region the alfalfa farm is a necessity, and as that wonderful forage crop can not be raised successfully without irrigation Chaves County, with its abundant supply of water, possesses advantages superior to any other portion of the Southwest.

WATER SUPPLY.

The irrigation systems of Chaves County at present obtain their supply of water from three sources:

First. The immense springs in the vicinity of Roswell, fed by subterranean streams of artesian origin. From these five beautiful, limpid streams of water flow, known as the North Berrendo, Middle

Berrendo, South Berrendo, North Spring River, and South Spring River. These streams are the fishing grounds where disciples of Isaak Walton find rare sport catching black bass, which are abundant.

Second. The large number of artesian wells, for which this locality is becoming famous. The first artesian well in this county was drilled in the summer of 1891 and flowed about 10 gallons per minute. The last one, developed in the town of Roswell, was drilled in five days to a depth of 285 feet at a cost of $550 and flows over 2,000 gallons per minute. Of these wells there are now over 100 in the county, and the aggregate flow of water from them is already an important addition to the supply for irrigation, in addition to its use for domestic purposes. A large number of wells are utilized for piping water into dwellings and business houses, the strong pressure making it practicable. A recent successful experiment by a citizen of Roswell has demonstrated the fact that this pressure is ample to operate a small hydraulic ram, costing $20, by which water can be forced into a large tank 30, 40, 50, or more feet above the ground and furnish an abundant supply of water for the second, third, and fourth stories of buildings. The artesian-well development and its uses, including the furnishing of power for machinery, is in its infancy here, notwithstanding the satisfactory results that have already been obtained, and it is confidently believed that further developments, when test wells shall have been drilled to much greater depths, will make present results seem small. The deepest well so far is 950 feet and flows water much softer than any other well known in this region.

Third. The flood waters from the great watershed of the White Mountain region, which extends for nearly 100 miles west of Roswell. The most of this supply goes to waste for want of storage reservoirs, which some day in the near future will be built, and these flood waters will then be used to make productive from 1,000,000 to 1,500,000 acres of rich, fertile land which now produces only grama grass for pasturage. Plans for the building of these reservoirs have been under consideration for some years and need only brains, energy, and capital to carry them into effect and practical operation.

SHEEP AND WOOL.

This important industry has grown remarkably in the past two years owing to the favorable conditions existing, making it highly profitable to flock masters. The number of sheep in the county is estimated by well-informed persons at fully 250,000 head. The reasonable tax rate, ample range, and other favorable conditions have caused owners from other portions of the Territory to move their flocks to Chaves County, and the business has become one of the most important.

ROSWELL.

Roswell, the county seat of Chaves County, has a population of 2,500, which is steadily increasing; excellent graded schools, superior to those of many a larger, older town in the States; the New Mexico Military Institute, fully mentioned herein, an ice factory, telephone system, one bank, prosperous churches, a flourishing commercial club of 65 members, and nearly all lines of business, represented by live, energetic men. As these lines are written, the board of town trustees have just received the report of an expert on the estimated cost of a sewerage system for the town, amounting to $27,000, a 20-acre farm for the proper disposition of the sewage having been donated for that

RAILROADS.

The extension of the Pecos Valley and Northeastern Railway from Roswell to Amarillo, Tex., 220 miles northeast, was completed February 15, 1899, giving direct connection with Kansas City, Chicago, St. Louis, and Denver, and to this is due very largely the increase of population and investment of capital in the town and county. The machine shops, roundhouse, and the general offices are located at Roswell, and thousands of dollars are being spent by the company in improvements here, a $10,000 building for the general offices being in course of construction at this time. When the improvements shall have been completed and a full force at work in all departments, which will be soon, the pay roll will aggregate $5,000 or more each month. Roswell is the central point on the line which, together with the superior quality of the water here and the abundant supply, and the fact that the principal stockholders in the company own valuable lands close to the town, are significant reasons for centralizing the railroad company's operating forces at this point.

From February 15 to July 1, 1899, the wool shipments from Roswell reached very close to 1,000,000 pounds, while 300 cars of cattle were shipped from this point in the same time. The shipments this fall will also be very large, adding heavily to the above figures. The Pecos Valley and Northeastern will in all probability be extended soon from Pecos to Boquillas, Tex., where it will connect with the road being built from central Mexico, thus adding very greatly to the traffic of the road and to its importance. Of more importance to Roswell is the proposed line west to the coal fields and gold and silver mines of Lincoln County, to a junction with the El Paso and Northeastern Railway, and on west to some point on the Atchison, Topeka and Santa Fe line, affording a market for the alfalfa, fruits, and vegetables raised here, and making it possible to secure a supply of coal and wood at lower figures than at present.

STOCK INDUSTRY.

The stock industry is the principal industry of the county of Chaves, and has grown rapidly during the past year. The assessed valuation of the cattle in the county of Chaves for the year 1899 is $1,000,000, while the actual valuation is $4,000,000.

One hundred thousand sheep have been permanently located within the boundaries of Chaves County during the last two months in addition to 150,000 already returned for taxation. We probably have considerably over 250,000 sheep now, and will sell right here in Roswell 1,500,000 pounds of wool next spring. The high price of beef cattle and sheep has added wonderfully to the income of Chaves County, and is on the increase all the time.

THE ADDITION OF THE LOWER PENASCO COUNTRY.

This addition gives Chaves thirty-six townships, rich in grazing and agricultural lands, and containing a particularly solvent community of about 500 souls, among whom last year there was not $500 in delinquent taxes. This section is naturally tributary to Roswell, and will be of great benefit to Chaves County as a paying business adjunct.

PORTALES.

The new town and post-office of Portales is located on the Pecos Valley and Northeastern Railroad. It is located in a splendid graz-

purpose by a progressive, nonresident property owner of large means. An election for the purpose of voting bonds will be called, and will without doubt carry. An electric-light plant is under careful consideration and will be installed in the near future. Ten miles of streets are graded, many of them being shaded by handsome trees, and various public improvements are being projected for early consummation. The inhabitants of the town include people from every State and Territory in the Union, and are intelligent, wide-awake, and progressive. Plans for the establishment of a female college are maturing and promise to meet with substantial encouragement, amply sufficient to insure its success.

From January 1 to September 1, 1899 (eight months), the buildings completed and in course of construction in the town amount to $115,000.

FRUITS.

The fruits raised in the Pecos Valley are the admiration and delight of all who see and taste them, particularly the apples and pears. When orchardists learn to plant peaches only on high ground, better results will be obtained, as it is noticed that those so situated bear without fail. Grapes and cherries have been neglected, but both are raised to some extent and of the finest flavor, particularly the former. Chaves County fruit takes first premium wherever exhibited. Apples, pears, and plums are especially fine. Experts agree that the apples raised here have no superior anywhere in the United States for size, color, symmetry, and flavor. Their natural high polish and their perfect condition make them ready sellers in every market. The absence of all pests common to apple orchards makes the lot of the orchardist here a happy one, compared with other localities where the principal part of his labor is the carrying on of an unequal fight with insects that defy all efforts to cope with them successfully. These facts make apple raising in Chaves County take rank next to the live-stock business in importance. One orchard of 500 acres is now coming into bearing and another of 250 acres is being set out. There are a number of older orchards which have been bearing for years, furnishing the product which has given the county its well-deserved reputation as a fine fruit region.

CLIMATE.

To those who have taken the pains to make intelligent inquiry, the remarkable climate of the Pecos Valley and its beneficial effect upon persons troubled with diseases of the throat or lungs, in particular, is almost too well known to call for any extended mention. The dry, pure air, the bright sunshine during the greater part of the year, the excellent chances for hunting and fishing and other diversions, make Roswell a desirable place for those who need such a climate. The great need has been a sanitarium, properly arranged, with modern conveniences, and conducted according to the best rules of practice laid down by acknowledged expert authorities who have acquired practical experience in the successful management of such institutions. This want is now to be supplied. One of the finest blocks in the town, 350 by 421 feet, beautifully situated, has just been purchased by a physician who has unlimited means at his command. He will erect a fine building with a group of cottages in connection, improve the grounds, and make the property one of the finest and most attractive in the Southwest.

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The new town and post-office of Portales is located on the Pecos Valley and Northeastern Railroad. It is located in a splendid graz-

ing country where water is easily obtained and in large quantities; is surrounded by large cattle ranches, and promises to become a large cattle shipping point. It now has a progressive population of about 250, two good-sized general stores, a lumber yard, etc., a $3,000 schoolhouse is in process of erection, and a thriving community is promised. During the year a post-office has been established at South Spring, 5 miles south of Roswell, and at Glen, 40 miles north, besides the one at Portales, already mentioned. Chaves County also absorbed two offices in addition to the country belonging to the Lower Penasco and Elk.

POPULATION OF CHAVES COUNTY.

The county now contains about 5,000 people and is daily receiving additions. By the time the next census is taken in June it will doubtless have many more inhabitants. This is a rapid increase and is an increase which is decidedly permanent. The new people are almost all people of means and intelligence, and are of great advantage to us socially and financially.

The New Mexico Military Institute, which is fully described as to purpose, etc., in another part of this report, will bring many people to Roswell, the county seat of Chaves County, as it has already done, for the purpose of educating their children and having them receive advantages equal to those to be obtained in the East.

COLFAX COUNTY.

Colfax County, situate in the northeastern part of New Mexico immediately south of the Colorado line, is 72 miles long from east to west and 54 miles wide. It contains 2,488,320 acres, more than one-half of which is included within the boundaries of the Maxwell land grant, title to which was confirmed in 1886. During the fiscal year ending June 30, 1899, large tracts of land amounting to 200,000 acres have been sold by the grant company to individual ranchmen, farmers, and minor corporations. The land within the grant is mostly mountainous, containing large tracts of valuable timber, coal, gold, iron, and copper. The remaining land in the county is mostly undulating prairie, resembling very much the one-time prairie land of the Mississippi Valley, with a gradual slope northwest to southeast. During the past year more than one hundred families have settled on this public domain, and with their predecessors are becoming thrifty farmers and ranchmen. A large portion of the land still remains the property of the Government. The soil is rich, and a great portion of it can be irrigated from the waters of the Red, Vermejo, Cimmaron, and Rayado rivers, and many smaller streams. The altitude varies from 5,600 feet in the southeastern portion to 7,000 feet at the foothills, arising to 13,000 feet on the western boundary, which is the highest point of the Sangre de Cristo Range. The northern portion is bounded by the Raton Range of mountains, being a spur or offshoot from one of the main ranges of the Rockies. The mountains on the north and west offer a natural protection from the snowstorms and blizzards, as well as from high winds. The average mean temperature is 50° F. near the foothills, the coldest being 32° and the warmest 72°. The atmosphere is dry and no great extremes of heat or cold exist. The average rainfall is 14 to 19 inches at this altitude, but the rainfall in the mountains runs as high as 30 inches. During the winter the canyons in the mountains are filled with snow, which

gradually melts during the spring and summer, furnishing a sufficient supply of water for need of irrigation.

The population of Colfax County is about 14,000, and though coming from various States of the Union, different parts of Europe and Mexico, together with the native population who remained there at the time New Mexico became part of the United States, and engaged in various pursuits of life, are yet as homogeneous a class of people as are found anywhere between the Atlantic and Pacific oceans, and are industrious, thrifty, and progressive.

In the northeastern portion of the county are the Johnson and Barela mesas, which have sufficient rainfall for all farming purposes without irrigation. On these two mesas alone nearly 40,000 acres of land are now under cultivation.

The mountain streams abound in trout, and there are still many deer, bears, turkeys, grouse, and other game to be found in the mountains.

RAILROADS.

There are two railroads within the county, the Atchison, Topeka and Santa Fe running from north to south a little east of the center, and a branch of the Colorado and Southern extending into the mountain district on the northwest corner.

CITIES.

The principal cities, towns, and villages are Raton, Gardner, Blossburg, Springer, Elizabethtown, Cimmaron, Maxwell City, and Catskill, all, with the exception of Cimmaron and Elizabethtown, being on the line of railroads, and are doing a good, thriving business.

Raton has a population of 3,800. The Atchison, Topeka and Santa Fe Railroad Company has its second largest machine shops at this point, and employs a large number of machinists. A splendid waterworks system, electric-light plant, and many costly and modern buildings have been erected recently.

Gardner is the headquarters of the Raton Coal and Coke Company, whose output of coal is from 60 to 70 cars per day, and has 76 coke ovens in operation. The coal is mined mostly by the use of electric machines. Here, also, you find a waterwork system and an electric-light plant.

Blossburg, lying within 1 mile of Gardner, was formerly the headquarters of this coal company, and considerable business is still done at this point.

Springer and Maxwell City each have good waterworks systems, and in the vicinity of each 20,000 to 30,000 acres of land has been placed under irrigation and farming has been making rapid strides at these points. At Maxwell City a modern flouring mill handles the wheat raised in the county.

Cimmaron and Elizabethtown are the two principal mining towns in the county. The latter during the past year has been making rapid strides in population and in the development of the mines surrounding it. Nearly all the mineral in the county lies within the confines of the Maxwell land-grant boundaries, but as this company offers the same inducement to prospectors and locaters as does the Government the mines are becoming rapidly developed and much mineral is now being shipped therefrom.

MINES.

The principal paying mines in the county are the Aztec, Black Horse, Montezuma, Red Bandana, Legal Tender, and Black Copper, the former having produced more than $1,000,000. Nearly all of these properties are now being worked on a paying basis. Within the past year two modern and up-to-date mills have been put into operation, one of which is a custom mill handling 40 to 60 tons per day.

Much placer mining is being done in the Ute Creek and the Moreno Valley, situate on either side of Baldy Mountain, also near Cimmaron and Bonita and Uracca canyons. Recent developments have shown that both quartz and placer mining may be carried on at a profit. It is but 25 to 50 miles from all of these mines to the line of the Atchison, Topeka and Santa Fe Railroad Company, and considerable ore is shipped to the smelters at Pueblo and Denver.

PETROLEUM.

Within the past year petroleum has been found in large quantities in the northeastern part of the county, and machinery is now being put in place for the purpose of extracting the same for market use.

LUMBER.

In the vicinity of Catskill seven sawmills are kept constantly at work and several hundred thousand feet of lumber are sawed daily, cut from the finest cedar, pine, and spruce timber.

CATTLE.

About 70,000 head of cattle are grazed within the boundaries of this county, contained in large pastures, one of which covers an area of 120,000 acres, recently purchased from the Maxwell Land Grant Company. The protection offered by the mountains on the west and east, and the dry, crisp atmosphere which cures the native grass when matured, does away with the necessity of cattle feed in the winter.

SHEEP.

One hundred thousand head of sheep are grazed on the plains both winter and summer without shelter, and seldom do their owners sustain loss by the storms of winter.

FARMING.

Considerable farming is carried on in the mountain valleys, where wheat, oats, rye, barley, and all vegetables known to the Mississippi Valley are raised in large quantities, unsurpassed in quality, and with but little cultivation. Alfalfa is the principal domestic grass, producing three cuttings each year.

Corn is grown in small quantities only, the summer nights being so cool as to prevent its maturing.

FRUIT RAISING.

Nearly all kinds of fruit grown in the temperate zone are raised at a profit, apples, pears, plums, cherries, apricots, and nectarines growing in abundance, yielding their producers larger returns than anywhere in the East. All small fruits grow with but little cultivation. The flavor of New Mexico fruit has become widely known, and that grown in Colfax County may be considered a fair average. The trees

are free from blight, and the fruit grower has never had to contend with any insects which destroy the profit of the fruit grown in the East.

CEMENT.

Near the town of Springer are several stratums of cement rock, from which the Springer Cement Company produces an excellent quality of hydraulic cement and cement brick for building purposes.

ARTESIAN WATER.

Six miles southeast of Springer two artesian wells have been flowing during the past eight years. The water therefrom is bottled and shipped to distant towns and cities for medical purposes. Chemists have declared it to be the best known mineral water for dyspepsia and kidney ailments. These wells are from 150 to 200 feet deep and produce a 6-inch flow, irrigating large tracts of land.

The small expense in sinking artesian wells offers a splendid opportunity for farmers of small means who desire to farm by irrigation.

DAIRY FARMING.

Three miles east of Raton, on the Sugarite Creek, is the largest dairy farm in the county, containing 20,000 acres of land. A butter and cheese factory produces large quantities of these necessaries, which are marketed in Raton and immediate towns.

EDUCATION.

Within the county are thirty-nine school districts in which school is taught from three to ten months in each year, thus guaranteeing to every child reared within the confines of the county an opportunity for at least a good common-school education. At Raton our teachers are employed ten months in each year. Good salaries are paid, thus securing able educators, who gradually lead the mind from the lower branches to the scientific, and also teach some of the classics and modern languages. Two school buildings have heretofore been used, one containing eight rooms; but the school board during the last year, seeing the necessity of more school room, ordered a new building at an expense of $15,000, which is now in course of construction.

The teachers' institute is held at Raton, the county seat, for a period of two weeks during the latter part of August. Experienced and highly-paid educators are in attendance, thus guaranteeing to each teacher in the county an opportunity to keep in the lead with the onward march of education and general progress in the schoolroom. Each school district in the county has a splendid and commodious school building.

PLUMBAGO.

Seven miles southeast of Raton several plumbago mines have recently been opened up and are now being developed. Several miners are employed, and the plumbago is shipped to Chicago, the headquarters of the company operating the mines, where the crude material is rapidly transferred to the marketable, which is found to be equal to any of that used in the lead pencils of to-day.

DONA ANA COUNTY.

Dona Ana County is situated in the southern part of the Territory of New Mexico, between the thirty-second and thirty-third degrees of latitude and the twenty-ninth and thirtieth degrees of longitude west from Washington.

The resources of this county are mainly agricultural. It is watered by the Rio Grande, which enters Dona Ana County in its northwestern part, and flows in a southeasterly direction through the county for a distance of 100 miles. The valley of the Rio Grande in this county is on an average about 7 miles wide. Part of said valley around Las Cruces (the county seat of said county) is known as the Mesilla Valley, far famed and favorably known for its production of wheat, indian corn, alfalfa, and fine fruits, especially peaches, pears, apples, plums, and grapes, and all kinds of berries, such as strawberries, gooseberries, etc. Among the many varieties, one of the best known is the mission grape, the best-flavored grape for table use known in the civilized world. This grape was introduced into Mexico, New Mexico, and California in the eighteenth century by the pioneers of civilization, the Franciscan fathers, who were early missionaries of this country. Therefore the name "mission grape."

All the agricultural lands have to be irrigated in this arid region. The irrigation is entirely dependent on the supply of water from the Rio Grande, and owing to the canals in the northern part of this Territory and Colorado the flow of water in said river is at the present time not sufficient to irrigate said lands, or any portion thereof, successfully during the year; and until a system of storage reservoirs and canals is inaugurated the present state of affairs will continue. In all probability the Elephant Butte reservoirs and canals will be built in the near future—as soon as their legal status has been decided by the courts—and said canals will be able to furnish water to all the lands subject to irrigation in Dona Ana County.

The soil of the Rio Grande Valley is a rich alluvial soil, consisting of the decomposed matter of trees, leaves, limestone, etc., which has been carried as sediment down the Rio Grande and left in the valley by its overflows, which have occurred periodically during the past centuries.

At the present time there are irrigated and cultivated about 32,000 acres in the valley, while there are 35,000 acres more susceptible to irrigation, provided a proper canal system is established, as above stated.

Of the 35,000 acres of land now lying idle, there are about 27,000 acres situated on grants, and the remaining 8,000 acres are vacant United States Government lands, subject to the homestead and desert-land entry acts.

Donna Ana County has also about 3,000,000 acres of mountain and table lands which are used for grazing purposes, and furnish grass for horses, cattle, and sheep from one year to the other. In a few years to come, as soon as plenty of water to irrigate with has been obtained, the Rio Grande Valley in Donna Ana County will be the farmers' paradise, as, on account of the climatic conditions existing, the altitude of the valley being on an average of 3,900 feet, the farmer can work all the year round, having very near perpetual sunshine, an even climate, not too cold nor too hot, no snow nor blizzards.

ALFALFA.

This is conceded everywhere to be one of the greatest wealth producers. In this valley it is almost an universal crop. Every farmer grows more or less of it. Without exception as to years, on the 10th of May the first cutting is being harvested, and it is the expectation that three more cuttings will follow, at intervals of about five weeks. But because the citizens have been prohibited from storing the great surplus of water that flows down the Rio Grande at a season when it is not needed, the number of cuttings is sometimes reduced to two. Some farmers are growing alfalfa for market on quite a large scale. One farmer usually sells about 700 tons, besides feeding a large amount to stock. Several others do about the same, but the actual statistics are not at hand. On account of the superior grade of cured alfalfa produced here, it brings a higher price in market than that produced in many other places.

WHEAT.

Perhaps there is no other spot in the United States where wheat of the very highest grade is more certainly produced than in this valley. It knows no enemies or pests of any kind, no rust, no chinch bug, nor anything else to interfere with its growth and maturity. While it is not raised on a large scale by anyone, it is so universally grown by all farmers, large and small, for home consumption, that four flouring mills are sustained in the valley.

INDIAN CORN.

This valuable cereal grows to perfection. It is no exaggeration to say that, both for quality and quantity per acre, this valley will rival the Missouri and Wabash bottoms. Under favorable circumstances a crop of corn can be grown from the same land from which the crop of wheat has been grown in the same year.

FRUITS.

Nearly all deciduous fruits grow well, and some of them do better than in almost any other place. Among these may be named peaches, which in the Mesilla Valley are equal to the finest to be found in any part of the world, both as to size and flavor. During this season (1899) when the peach crop has been a failure in many parts of the United States, here it has been large. From one orchard over 7 full carloads of early peaches were shipped, besides the large amounts sold at retail and in smaller quantities. Apples, pears, quinces, plums, and prunes are grown in the greatest abundance and are of most excellent quality. The codling moth here, as elsewhere, is giving the apple grower some trouble, but it is hoped that some means will be found to overcome its ravages.

GRAPES.

The summer climate here seems to have a peculiar value in converting the starch of fruits into sugar. For this reason the grapes grown in this valley are thought to possess a richness of flavor seldom found in any others. Many varieties are grown, but the Mission, the Muscat, and the seedless are leading varieties for shipping purposes.

VEGETABLES.

Vegetables of nearly all kinds, except Irish potatoes, do well, and are grown in abundance for home consumption and for shipping.

IRRIGATED EGYPTIAN CORN IN PECOS VALLEY.

Cantaloupes and watermelons are exceedingly fine and delicious. Particular notice may be made of the tomato. The raising and canning of tomatoes has become quite an industry, and the product of the Mesilla Valley canning factory brings in open market a price much higher than those produced elsewhere. Mr. Theodore Roualt is growing the present season about 300 acres of tomatoes, and expects to can and ship about 30,000 cases of same and 6,000 cases of canned green chile.

There is but one thing in the way of making this valley a "farmers' paradise"—our inability to store the waste waters of the Rio Grande.

LABOR SUPPLY.

Owing to the proximity of this county to the border of Mexico, the supply of common laborers is fully equal to the demand. Skilled artisans command fair wages, especially carpenters. During the past year or so miners have been in demand, at customary wages, and the prospects are that increasing numbers will be employed as the new mines are opened up.

PUBLIC BUILDINGS.

Las Cruces, the county seat of Donna Ana County, possesses a very pretty and commodious brick court-house, finished with stone, surrounded by beautiful grounds; a large brick schoolhouse, a large hall, and an academy conducted by the order of the Sisters of Loretto. Union Park is situated just diagonally across the street from the court-house grounds; this park has a large pavilion in the center. It is most beautifully laid out and planted with trees and flowers, which line broad avenues, and was an inception of the "Woman's Improvement Association," a club composed of the foremost ladies of the town.

The following religious denominations have church edifices here: Catholic, Methodist Episcopal, Methodist Episcopal South, Methodist mission, Presbyterian mission, and Presbyterian. About 2 miles south of Las Cruces, at Mesilla Park, are located the buildings and grounds of the New Mexico College of Agriculture and Mechanic Arts. The main building is a fine structure of two stories and a basement, consisting of thirteen rooms. Science Hall, a large two-story brick building, contains eleven large recitation rooms and five smaller ones. There is also an engineering building, girls' dormitory, seed house, and a large greenhouse, and numerous auxiliary buildings.

The college farm contains about 250 acres, all in cultivation, one-half being river-bottom lands.

SOCIAL AND INDUSTRIAL PROGRESS.

It is essential to the highest development of any community that its members have a common language. The older generation of the native people of this county, as in all other counties of the Territory, have been born under another Government, with another language, and can not be expected to speak English. However, it is an encouraging fact that by far the larger portion of our younger native-born citizens speak more or less English, and it is a further noticeable fact and truth that each succeeding generation commands a freer use of the English language.

The native people who formerly used primitive implements in their agricultural pursuits are rapidly adapting themselves to better and more modern methods.

MINES AND MINING.

In the southeast corner of New Mexico is situated the Organ Mountains. If this mineral formation was in Colorado, Montana, Idaho, or any of the Western States in which active mining and prospecting is carried on there would be to-day 5,000 men at work. Commencing at the Modoc mine, on the extreme south end of this formation, minerals in good paying quantities have been found at intervals that have extended as far as the great copper deposits of the San Andreas, 70 miles to the north. The contact of lime and granite is without a break the entire distance. The Modoc mine has been developed to a depth of 160 feet by a shaft. The ore has increased in value and worth with every foot sunk. At the bottom this vein is 15 feet wide, and 30 per cent lead ore. With lead at the present price this would be a very valuable mine if situated in Colorado. The Bennett-Stevenson mine on the same contact, about 6 miles to the north, has been a large producer since the early sixties. The production for the past year (mining what had been left behind) was in excess of $40,000. No work has been done on this mine below the water level. About 2 miles farther north the Torpedo mine is producing a carload per week of 20 per cent copper ore, the work of two miners. The Memphis, adjoining the Torpedo, has been a great producer of copper and high-grade silver ore. At present this mine is only operated to furnish water for the Bennett mill. Still, on the same contact extending to the north is the Jay Gould mine, shipping high-grade ore, copper and silver. The Merrimac, Little Buck (that produced $35,000 in silver in a few days), the Edison, Brown and Hafford, McLaughlin, Thompson, and Roualt, and other propositions all show veins of lead, copper, and silver in paying quantities when the right people come along and take hold of them. The Bear Canyon mines of Messrs. Bennett & Friedenbloom will some day be immense producers of lead and silver. At the head of St. Nicholas Canyon are found the finest indications of the existence of lead and silver ores yet to be found. The great San Andreas copper deposits are now shipping high-grade copper ores to El Paso. The Atchison, Topeka and Santa Fe Railroad contemplate putting in good roads to these mines to secure the freighting of the ores. This is truly a wonderful contact, but it needs new blood, with energy and capital. It will then give employment to thousands and add vast wealth to the Territory.

CLIMATE.

Donna Ana County, in common with the other sections of New Mexico, can lay claim to a health-giving climate; but apart from the generally favorable reputation of the Territory, as a whole, this county, embracing as it does the famous Mesilla Valley, has advantages from a climatic and public-health standpoint which are unparalleled. That modern scourge, typhoid fever, is very little known in this region, and the ordinary zymotic diseases are only occasionally seen. Among the native population tuberculosis is almost unknown, though of late years several isolated cases have come under the writer's notice.

The excellence of the health of school children is very noticeable, and is well attested by the records of attendance. As a location for the rearing of children where they may escape the various illnesses to which their age predisposes Donna Ana County can have no superior.

The climatic advantages of this section are manifold, as will be readily understood from the following condensation of the United States Experimental Station reports: During the last five years the average number of sunshiny days has been three hundred and forty-eight; the relative humidity during the winter months being 34. This maximum amount of sunshine and unprecedented atmospheric dryness, combined with the pure air which our mountain situation affords and the equability of temperature which our moderate altitude insures, makes the Mesilla Valley, the "pride of the county," an ideal health resort. In fact, it is nature's great sanitarium. These wonderful climatic conditions have been taken advantage of in the establishment of numerous resorts for the care of patients with incipient pulmonary diseases. At the present writing a sanitarium is under construction at Las Cruces which will be a model of its kind. The purpose of the company is to erect a large main building, 42 by 100 feet, two stories high, containing twenty-two great rooms, library, dining rooms, and smoking rooms; the whole to be surrounded by large verandas, with a southern exposure. Within easy access are to be erected several single-story cottages, after the style of the Saranac Lake Sanitarium. It is hoped in time to make the main building an administrative building and all invalids to be housed in the adjacent cottages, following in the lines of other institutions of similar purpose. There is under consideration two more institutions of this character.

It has given much pleasure to the writer to see this part of New Mexico attract such attention from the medical profession. At the last two meetings of the American Medical Association, held respectively at Denver, Colo., and Columbus, Ohio, the writer presented papers dealing with the climatic therapeutics of southern New Mexico, and it was very gratifying indeed to note the general favor in which they were received.

That Donna Ana County has a bright future before it nobody will deny, for it possesses many of the requisites for securing such, not the least of which is its wonderful climate, attracting as it does the best class of citizens from all parts of the universe.

THE ELEPHANT BUTTES DAM.

The greatest setback this section has ever had was that resulting from the stopping of work on what is familiarly known as the Elephant Buttes dam. A brief history follows:

A company known as the Rio Grande Irrigation and Land Company, Limited, of London, acquired the rights of the Rio Grande Dam and Irrigation Company. The object of this company was to store the overflow waters and irrigate the Rio Grande Valley in the southern part of this Territory. Of this overflow water there is an immense quantity that goes to waste every year, as there are no dams on the Rio Grande to store these waters.

The general plan of this company was to construct a mammoth dam at the Elephant Buttes, near Engle, N. Mex., and form at this point the largest storage reservoir in the world. In addition to the large dam, a series of smaller ones were to be constructed, together with canals, and by this means bring under irrigation and cultivation hundreds of thousands of acres of the most fertile land on the continent.

Work on the smaller dams and canals was commenced in November, 1896, and continued until the spring of 1897, upward of $90,000 hav-

ing been expended. At this point the United States brought suit to enjoin the company from building the storage dam. Work had to be stopped, and that already done was left in such a condition as to be subjected to great damage by the annual floods. The ground for seeking the injunction was that the Rio Grande was a navigable stream.

This claim is preposterous. The Rio Grande is not and never has been a navigable stream, except where it is affected by the tide. The true secret of the attack can be found in the effort of certain persons to have constructed at El Paso an international dam, and under the impression that the Elephant Buttes dam would interfere with their plans and monopolize the water, they oppose the enterprise. A careful investigation goes to show that, instead of the Elephant Buttes dam monopolizing all the water, the reverse would be the result, and the people at and near El Paso would have more water after its construction than before.

It is to be hoped that this question will shortly be settled, and the company permitted to resume operations, for with the completion of this work will blossom forth one of the richest agricultural, fruit, and dairy sections in the West. It will outrival California, and supply the East with a superior and better quality of fruits and vegetables than can be produced in any other section of America.

The superintendent of the public schools of Donna Ana County herewith submits a report of the condition of the public school districts within the county of Donna Ana, Territory of New Mexico, for the year ending October 1, 1898.

Number of districts, 28; number of teachers, 6 male and 22 female, total, 28; enrollment of pupils, 638 males, 444 females, total, 1,082; average daily attendance, 394 males, 295 females, total, 689; number of scholars between the ages of 5 and 21 years, 1,977 males, 1,661 females, total, 3,638. Average number of months taught, 4.

RECEIPTS.

Balance October, 1897	$2,851.68
From the county school fund	5,410.80
Poll tax, fines, etc	2,861.77
Total	8,272.57

EXPENDITURES.

Teachers' wages	$5,355.11
Rent, fuel, etc	458.99
Schoolhouse and grounds	1,095.32
Total	6,909.42
On hand	4,214.83

PRIVATE INSTITUTIONS.

Presbyterian Mission School: Value of property, $1,000. Enrollment of pupils—males, 45; females, 82; total, 127.

Visitation Academy: Value of property, $2,500. Enrollment of pupils—males, 39; females, 30; total, 69.

EDDY COUNTY.

The county of Eddy is fast demonstrating the fact that it contains within its boundaries all the possibilities for making it one of the greatest agricultural centers in the Southwest. That its vast irrigation system has had much to do with its present prosperity and the brilliant future that is now at its very doors, there is no manner of doubt. It was only when that system was first inaugurated that the

SPILLWAY, EDDY IRRIGATION RESERVOIR.

growth of the Pecos Valley really began, and it may truthfully be said that since that time the growth of the various industries in Eddy County has been phenomenal. It might be imagined that the one great interest that takes precedence over all others in this Western country, namely, that of cattle raising, could not be affected by irrigation. Nothing could be farther from the truth. Irrigation has brought cattle into the country by the thousand. It has concentrated the interests of their owners in their establishment of one of the largest shipping points in the Southwest at Carlsbad; it has been instrumental in making the town not only their headquarters, but also the home of many of them.

As to the live-stock industry in the county, it is estimated that during the past year it has been increased just one-third—that is to say, that the value, as well as the number of the herds and flocks, has appreciated one-third over the estimates made last year. The Pecos Valley and Northeastern Railway, the extension of which was opened for business between Roswell and Amarillo on the 24th of February last, report that during the spring they transported over their line from all points over 130,000 head of cattle. Of this immense shipment it is safe to say that at the least three-fifths originated at Carlsbad or in the territory tributary to it. Not only did the county show progress made by the number of cattle shipped, but a more valuable feature by far was made apparent—that the grade of the stock was equal, if not generally superior, to that of stock shipped from older communities south of here. This is explained by the fact that the cattlemen of the valley, having been generally successful during the past two years, have invested a large portion of their profits in the purchase of a higher breed of cattle than those of other districts. Proportionately as much fancy stock has come into Eddy County during the year as into any cattle county of Texas. Herefords are, and apparently always will be, the favorite here, and after them comes the Durham as a close second. A very conservative estimate of the number of cattle on the ranges of the county, or immediately adjoining it on the east, places the number at close to 500,000 head, in herds going from 1,000 to 60,000. When it is said that the owners of this vast number of food animals are actively breeding them up to a standard of excellence that will gain for them the very highest prices paid in the great cattle centers for choice beeves, some idea of the progress made in this one great industry alone may be arrived at.

As to the sheep industry of the county there is no doubt but that it has been nearly or quite doubled during the past year. The constantly advancing price paid for wool, the active demand from Kansas City and Chicago for alfalfa-fed lambs have had much to do with this, especially when the exceptionally fine feed for flocks is considered, and one other matter that is a powerful incentive to sheep men to bring their sheep this way, and that is the fact that so far as known this section is the only one in the entire West where there is no friction of any sort between the cattle raiser and the sheep man. The following item, taken from the American Sheep Breeder, of Chicago, sets forth in most unmistakable language reasons why southeastern New Mexico is shortly destined to become one of the greatest sheep-raising centers of America:

The importance of the sheep-breeding industry on the Pecos River is gradually but steadily increasing. South of here, on the Rio Grande—the great dividing line between the United States and Mexico, a muddy creek, dry for most of the year, and which cost the United States $13,000,000 in 1847 to establish as a national

boundary line—there is to-day probably more sheep than in any other section of the United States of anything like the same area. From the proximity of this district to Mexico, and the facility with which sneep can be brought in from Mexico and the import duty evaded, it is very unlikely that the flocks there will ever be remarkable for anything but numbers, for although the "Dons" across the river have, for the past two or three years, been breeding up their cattle, the shipment of a well-bred lamb into the Republic is of anything but frequent occurrence. Mexican sheep to-day are practically what they were twenty years ago, or fifty, for that matter—straddling, rawboned animals, built for speed rather than for mutton. The appearance of a flock would suggest to one that it would take a dozen generations of careful breeding to bring them up to anything like the standard of the most ordinary animal seen on northern pastures.

Now this vast region, extending along the river for upward of 300 miles, and embracing within its area some six or eight of the largest counties of Texas, is virtually given up to sheep. Greaser and "Gringo" alike look for a living from their flocks, and the cattleman is decidedly in the minority. Notwithstanding all this, this district is not sought by progressive sheep men who raise sheep for mutton as well as for wool, and these men are gradually moving their flocks northward up the Pecos River into New Mexico. The advantages they derive from leaving the Rio Grande country are twofold: First, they lessen the danger of their flocks becoming mingled with the poorly bred Mexican animal, and so losing a year's labor and the expense they have been to in an effort to breed up their sheep; and next, from the fact that wild animals of the depredating sort are as plentiful on the Rio Grande now, or nearly so, as they were ten or twenty years ago. This is not to be wondered at, as sheep men are not nearly as apt to form clubs and pay scalp bounties to protect a sheep worth $1 to $1.25 as they would be if the same sheep was worth $2.50 to $3.50. Some of the stories of the depredations of coyotes, lobo wolves, panthers, and mountain lions among the flocks almost surpass belief. Whether altogether true, or only partly so, it is certain that the losses there from this source are greater than a man with a flock of even passably well-bred sheep could afford to stand. For this reason as much as for the one first named, the Pecos country is slowly filling up with a class of sheep men who mean to make the most out of their animals in a practical and businesslike way, and that, of course, means "breeding up" to a standard that makes mutton that will bring money in a market like Chicago. As a matter of fact, there are many sheep raisers, or rather woolgrowers, in northern Mexico or in extreme southern Texas, whose flocks are so particularly poor in blood that if a carload of them should be unloaded at the Union Yards in Chicago they would excite as much curiosity as so many coyotes would, and whose ultimate destination would be the soap factory. The Pecos Valley hopes in time to breed up its flocks as well as its herds, and the time is not far distant when a steer or lamb fattened on the Pecos River will carry with it a reputation similar to that which a Scotch turnip-fed steer or a Southdown commands on the London market.

The cultivation of the alfalfa clover and its prolific yield was the first product that drew attention to Eddy County. It, in fact, made it famous. The wonderful fertility of the soil, as evidenced by this one product, was so pronounced that even the attention of the Department of Agriculture was directed to the valley, and for three months of the present year this Department maintained two of its experts from its division of soils—Messrs. Means and Gardner—in this locality making exhaustive and critical tests of the different strata and noting the different products that appeared to thrive best in the various localities. Later in the summer the Department dispatched two others, attachés of the division of biology—Messrs. Higginson and Bailey—whose mission was to make an examination on the lands in the neighborhood of Carlsbad strictly with reference to their adaptability to the culture of the sugar beet. Their verdict, after a close examination, was that the sugar beet had its natural home in this county, and that the industry was as yet in its veriest infancy.

RAILROAD FACILITIES.

The completion of the Pecos Valley and Northeastern Railway to Amarillo, as noted above, now gives that road a total length of 370 miles, its southern terminus being located at Pecos City in Texas, on

the Texas and Pacific Railway. It places Carlsbad within twenty-four hours' ride of Fort Worth and Dallas, Kansas City thirty hours, St. Louis forty-eight hours, and Chicago fifty-two hours. Connections are made with three trunk lines, two at Amarillo, the Atchison, Topeka and Santa Fe, and the Denver, and with the Texas and Pacific at Pecos.

THE CLIMATE.

The Territory of New Mexico has for many years been renowned for its perfect climate, its absolute freedom from all malarial complaints, and the wonderful effect it has in pulmonary diseases when not too far advanced. Men are living in Eddy County to-day who came here ten years ago to die. The equable weather, the dry and bracing atmosphere at once asserted their power and begun to heal the torn and bleeding lungs and quiet the troubled nerves. It is a climate, too, that appears to infuse new vigor both in the body and in intellect. The desire of the old Roman to have "Mans sano in corpore sano" (a sound mind in a sound body) finds its living realization on the streets of Carlsbad in the person of nearly every man that has made the valley his home for any length of time. The mean temperature of the summer is 80°, seldom exceeding that figure, and in winter 42°, while for spring and autumn it is 60°. The following from the pen of Dr. C. H. Wright, one of Carlsbad's leading physicians, verifies the above statement:

During the last few years the medical profession has made great progress in the study of climatology as a relief and benefit to nearly all constitutional diseases. The climate of southeastern New Mexico, and especially the Pecos Valley, is rapidly becoming known as a panacea for all bronchial and lung troubles, as well as great benefit to stomach and kidney derangements. This fact is thoroughly substantiated by the multitude of cures which have been effected here in the last ten years. The Pecos Valley has been well described as the natural sanitarium of the world, and why? First, because we have all the requisites to make a complete health resort, namely, a dry air, a pure air, an air of moderate temperature, not contaminated by passing over swamps or through large cities, but coming direct from mountain ranges, and contains nothing but life-giving elements. Second, we have what but few places in this region can boast of, pure water, as well as springs containing medical properties which are a benefit to stomach and kidney troubles. Last but not least, the almost perpetual sunshine. The absence of sudden changes of temperature is one of the strong features of this section, which is a great aid in all forms of diseases or weakened conditions.

During the last year the county of Eddy has had no more deaths among the residents from disease than you could count on your fingers, which speaks well for a population of over 3,000 inhabitants. Although we have had an epidemic of measles which traversed the whole county during March, April, and May, there has not been a death reported either from the disease itself or complications, which is sufficient proof that not only is the climate a benefit to chronic troubles but greatly modifies the acute infectious diseases. One coming to the valley for the first time from the north must evidence surprise at how little he suffers from the heat. We have no sultry days followed by more sultry nights. The nights are clear, cool, and refreshing. The population of Carlsbad and surrounding country is largely made up of people in search of lost health. To-day they are energetic, strong, and enjoying the best of health. These are our best advertisements. In my two years' practice here I have not seen a single case of pulmonary trouble but what was benefited by the climate, and I believe my fellow practitioners will testify likewise. The great point for physicians sending patients here for beneficial effects of this climate is not to wait too long. But all cases of pulmonary trouble will be benefited if the decided firm grip of death does not expect to claim him in a few days.

MINERAL SPRINGS.

About a mile northwest from the town of Carlsbad, on the banks of the Pecos River, is a group of springs that in times past were thought to be remarkable merely from their unparalleled flow of water, two of

the largest emitting a stream at all seasons, wet or dry, of over 5,000 gallons a minute each, and the others of lesser amounts. A year or more ago, it having been noticed that the water of the larger of the two springs appeared to be strongly impregnated with minerals, it was suggested that it be analyzed. The result was that the waters were found to be almost analogous with those of the great mineral spring at Freidrickshalle, in Germany. The spring was then named Carlsbad. The rapidity with which the healing qualities of its waters became known, the almost instant relief it gave to stomach and kidney troubles that had stubbornly resisted medicine, and its effects on rheumatic complaints called so much attention to this locality that it was determined to change the name of the town, then known as Eddy, to the name of the spring, Carlsbad. This change was effected by a popular vote on the 23d day of May of the present year.

GEOGRAPHICAL SITUATION.

Eddy County lies between the thirty-second and thirty-third degrees of latitude, the two degrees forming almost exactly the northern and southern boundaries of the county. Its altitude is 3,200 feet. It extends north and south 66 miles and east and west 95, being rectangular in shape and containing about 6,300 square miles. Of this area the lands bordering on the Pecos River, extending from 3 to 10 miles on either side, are of extraordinary fertility, producing, wherever water is introduced, every cereal, vegetable, and fruit known to the temperate zone in abundance and with unfailing regularity. The balance of the land is strictly pastoral, and the nutritious grasses with which it is for the most part covered are producing now as excellent cattle as are to be found anywhere in the Territory.

THE IRRIGATION SYSTEM.

This all-important feature in the development of the country is naturally the first one about which inquiries are made by prospective immigrants or investors. Taking the irrigation system of the valley as a whole, it is beyond all question the largest in America, and the immense sums that have been expended on it make it the most complete as well. In Eddy County there are two large artificial lakes, covering a superficial area of some 10,000 acres, with a capacity of 100,000 acre-feet—that is to say, holding sufficient water to place 1 foot of water on 100,000 acres of land. There are now in active operation 40 miles of canals and main laterals, so arranged that at any time they can be extended in any direction. The main canals are from 30 to 45 feet in width, and constructed in the most substantial manner. The annual water rent imposed by the irrigation company of $1.25 per acre is said to be the smallest fee for similar service in the United States, and thus far in its history this company has never caused a dollar in loss to its customers by a failure to supply them when needed.

PRODUCTS.

It may be said that up to this time the soils of Eddy County have developed peculiar fitness for four different products, all of which they produce when properly irrigated, with regularity and in abundance. These are fruit, alfalfa, vegetables, and the sugar beet. It is to these that the county thus far has looked for its permanent and positive advancement as an agricultural center.

As to its fruits, while nearly every variety thrives and makes rapid growth, the peach produces most abundantly, and in size, flavor, and appearance it fully equals any raised in the country. The orchards are absolutely free from bugs or fruit pests, and a specked or wormy peach or apple is unknown. During the present year from the Rio Pecos orchard alone, an orchard covering but 16 acres, over 3,000 boxes of the very finest fruit will be shipped, and the demand is such for fruit from this section that not one-half of it can be satisfied.

Alfalfa produces on an average 5 tons to the acre annually, in four and sometimes five cuttings, and what might be called almost the standard price for the hay in Carlsbad is $10 a ton, with a demand that usually exceeds the supply. Many cattle feeders who this year propose fattening cattle and sheep are leasing alfalfa pasture for which they pay $5 an acre for the season. Beef and mutton fed on this sweet and nutritious clover acquire a flavor contributed by no other fodder.

Of the minor sources of revenue—that is to say, those requiring a smaller capital to start them—the raising of vegetables presents a field of profit in this country for which it would be hard to find a parallel anywhere. In the first place, there is always a large home market, and the prices obtained are always highly satisfactory to the grower. One man last season cleared $5,000 on 20 acres of celery. As to asparagus, there is just sufficient alkali in the soil to not only render the cultivation of this esculent very easy but highly profitable as well. It matures in the spring fully a month earlier than in the North or in Texas, and consequently commands a high price. Other vegetables, in fact nearly every sort, thrive in the rich river bottoms of Eddy County, and with a few acres, 5 or 10 at most, a man with a little money for seed and a few farming implements can not only make a good living the year round, as the soil can be worked to advantage here every day of the 365, but he can in a short time render himself independent of the world.

In conclusion it can be said that it takes no prophetic eye to foretell the future of this country. The evidences are at every hand, standing forth legible as the hills, clear as the noonday. Wherever the hand of man has introduced water upon these hitherto arid wastes he changes them into fertile and productive fields, rich with the fruits of the earth. He stands astounded at the result of his own handiwork. He finds that here amidst the brown hills and the sage-brush deserts of the Great West an oasis of shade and verdure has appeared, destined, like the great banyan tree of the forest, in the coming years to yield shade and fruit to wide neighborhoods of men.

GRANT COUNTY.

The past year has been one of unprecedented prosperity in Grant County. The two principal industries of the county, cattle raising and mining, have proved more than ordinarily profitable. The high prices obtaining for cattle have enabled many of the stockmen to acquire residences in the cities and towns, where they avail themselves of the greater educational facilities for their children.

In mining phenomenal success has been attained. Never in the history of any of the Western States and Territories have there been made such rapid strides in the development of the wonderful mineral resources of the West.

Taxable value of real estate.

RAILROADS.

Narrow gauge:		
30 miles main track	$75,000.00	
1 mile side track	1,500.00	
Buildings, tools, etc	4,125.00	
		$80,625.00
Southern Pacific Railroad Company		
91.30 miles main track	639,100.00	
9.07 miles side track	10,820.00	
		649,920.00
Atchison, Topeka and Santa Fe Railway Company:		
10.98 miles main track	71,370.00	
4.62 miles side track	5,544.00	
Silver City Branch:		
48.29 miles main track	217,305.00	
3.90 miles side track	4,680.00	
Silver City and Northern Branch:		
14.50 miles main track	43,500.00	
0.97 miles side track	970.00	
Buildings, tools, etc	11,020.00	
		354,389.00

TELEGRAPH LINES.

Southern Pacific Company, 91.30 miles single-wire telegraph line	2,280.00	
Atchison, Topeka, and Santa Fe:		
4-wire telegraph line	439.20	
1-wire telegraph line	120.25	
Western Union, 90 miles, 3 wires and instruments	3,180.00	
New Mexico and Arizona Telegraph Company, 30 miles single wire	750.00	
		6,769.45
		1,091,703.45

AGRICULTURAL LANDS AND IMPROVEMENTS THEREON.

Irrigating ditches, 1¼ miles	150.00	
Grazing land value	40,270.00	
Improvements	53,520.00	
Agricultural land	80,547.00	
Improvements	107,055.00	
		281,542.00

TOWN PROPERTY.

City lots	151,520.00	
Improvements	396,350.00	
		547,870.00

Taxable value of personal property.

Horses	$98,670.00
Mules	4,080.00
Beef and stock cattle	1,101,700.00
Sheep, graded	8,775.00
Swine	2,080.00
Burros	760.00
Wagons, carts, trucks, carriages, and vehicles of all kinds	38,720.00
Saddles, robes and blankets, harness	9,160.00
Sewing machines	9,170.00
Average value of merchandise during year ending March 1, 1899	123,410.00
Amount of capital employed in manufactures	2,000.00
Farming implements	2,910.00
Fixtures of saloon, office, or other business places	28,420.00
Money on hand	1,075.00
Books—law, medical, miscellaneous	3,710.00

Watches and clocks	$1,590.00	
Jewelry, gold and silver plate	3,985.00	
Musical instruments	5,300.00	
Household furniture	45,280.00	
Shares of stock in national or other banks	54,400.00	
Corn	450.00	
Hay	150.00	
Lumber	625.00	
Steam engines	3,500.00	
Sawmills, flouring mills (steam)	2,500.00	
Tools—carpenters', blacksmiths', etc	1,425.00	
Mines, surface improvements	84,968.00	
Mines, net product	18,800.00	
Credits—notes, book accounts, etc	1,680.00	
		$1,654,293.00
Total		3,575,408.45

The foregoing table represents but a tithe of the real value of property in Grant County. In the above estimate, taken from the assessment rolls of the county, cattle are valued at $11 per head, this value being fixed by the board of county commissioners, while the same cattle are eagerly sought by buyers at prices ranging from $16 per head for yearlings to $24 per head for full-grown stock.

The enormous values of mining property are absolutely without taxation except the improvements, as buildings, mills, etc., upon the mines. This is by reason of a Territorial law passed to encourage the development of the mineral resources of the Territory, and whereby mines are not subject to taxation until ten years after a patent for the land has been obtained from the United States Government. As few of the mines are patented, and fewer still have been patented for ten years, this great property value does not yet take a place in the taxable values of the county.

It will also be seen that the taxable valuation placed on railroads and other properties is low. Hence, while the rate of taxation may seem high to people of the East, yet it is in reality no higher than in other parts of the United States.

AGRICULTURE.

The agricultural resources of Grant County are but little developed, and yet the area under cultivation would supply an abundance of food products for the inhabitants of the county if properly managed and cared for. The principal agricultural section of the county at present is on the Mimbres River, a small stream situated in the eastern portion of the county. There are now about 20,000 acres under cultivation upon this stream which furnishes the water for irrigation.

It is proposed to build a system of storage reservoirs which will store sufficient water to irrigate 100,000 acres of the choicest land in the West, which lie just below the site chosen for the main dam. Negotiations have been completed whereby the company will acquire title to this land, and within a few months work will be commenced upon the dam and reservoirs. The land will be colonized with thrifty farmers from the East, and hundreds of thousands of dollars now sent annually from this county to Eastern States for hay, grain, poultry, eggs, butter, and other farm products will be kept at home.

The company is composed of Chicago capitalists, and is known as the Rio Mimbres Dam and Irrigation Company, with A. R. Burkdoll as resident manager. The company now has a lesser experimental

irrigation system at work, and has 1,000 acres of land under cultivation. Here there is found the first producing canaigre farm in the United States. The cultivation of this crop is bound to soon prove a profitable and extensive industry, as it has been fully demonstrated that the valley of the Mimbres produces canaigre of superior quality to that grown in any other part of the world. The poorest of the many samples analyzed for the Rio Mimbres Dam and Irrigation Company gave returns of 30 per cent of tannic properties, while the canaigre tubers grown in other localities give 11 to 25 per cent of tannic values. This company has 200 acres in canaigre. As the canaigre tuber at two years' growth produces 12 tons per acre, and the product is worth $6 per ton upon the ground, when dug, it is plain that a canaigre crop is a very valuable one, and is obtained with less labor than is generally expended on other crops which give anything near as good cash returns.

There are thousands of acres upon the Mimbres producing fruit of superior quality, the peaches and apples competing successfully with those raised in the States, as, in fact, many carloads of apples especially have been shipped to the East and to Arizona. Fruit grown in the foothills of the Mimbres Mountains may have equals elsewhere, but superior it would be difficult to encounter. A fortune awaits the happy man, who, having the means, has the business foresight to erect a canning plant in that neighborhood.

On the Gila River, to the north and west of Silver City, there are about 5,000 acres under cultivation, one-fifth of which is operated by the Gila Farm Company, which, besides raising all of everything required for home consumption, produces all kinds of fruits of the finest grades obtainable anywhere. A small apiary on this farm produces 10 tons of honey annually. With storage reservoirs and dam properly constructed the area of tillable land along the Gila could be increased to 50,000 acres.

LIVE STOCK.

The cattle interests of Grant County are by no means an insignificant feature of wealth, amounting as they do to a considerable sum of money yearly to the thrifty stock grower. Grant County is by far in the lead of any other section of the Territory in this important industry. The shipments for a number of years past have been unusually heavy, that of 1898 aggregating in round numbers $1,000,000 in value. Silver City is the largest shipping point for cattle in southern New Mexico, and during the busy season the festive cow puncher is a familiar sight upon the streets. The stock yards south of the city are large, easy of access, and supplied with all the modern conveniences. Stock from all the northern and western sections of the county ship from here, as also frequent shipments from southern Socorro County. The Santa Fe system pays special attention to this large and lucrative branch of their business.

The recent rise in the prices for beef cattle has proven an incentive to stock growers, and they are consequently giving the subject of better beef their strictest attention. The stock cattle of this immediate vicinity are of a high grade, and the profits are accordingly great. Prices have been good, ranging from $16 to $18 and $22 for yearlings, twos, and threes. The ranges, both mountain and valley, are good this year, as rains have been abundant and cattle had fared well during the winter last past. Sheep and goats, of which there are quite a number in this county, have proven remunerative to their

owners as food producers, while the wool and cashmere fleeces have been disposed of at fancy figures. The stockmen of this section all wear smiling countenances, and some of them diamonds. Their bank rolls have increased amazingly during the past six months, and fall sales promise to greatly add to their already plethoric purses. Cattle passed through the winter well and the calf crop this year is good. The outlook is decidedly encouraging and the stockmen accordingly in happy spirits.

Hog raising has hardly as yet become a distinctive industry, although there are several small concerns in operation in the Burro Mountains, where mast is plentiful. A few farmers along the Middle Gila who raise corn extensively and who have no immediate market for their crops put it into pork, which readily brings 5 and 6 cents per pound in Silver City.

There are a few extensive horse farms in the county, but they are mostly conducted in connection with the cattle ranches, as riding ponies are a prime necessity to the cow man and are constantly in demand to replace worn out and aged stock.

HOT SPRINGS.

There are a number of mineral springs in the county, some of which have proven to possess remarkable medicinal qualities. The celebrated Hudson Hot Spring, located about midway between Silver City and Deming, on the line of the Atchison, Topeka and Santa Fe Railroad, has already achieved a wide reputation as a health and pleasure resort. The temperature of the water registers 142° F., and is almost a sure cure for rheumatism, blood and kidney diseases, and various other complaints.

The hotel accommodations are of a superior quality, and during the summer months no more delightful pleasure resort can be found in the country.

The Gila Hot Springs, 50 miles north of Silver City, are much sought for their medicinal qualities, but the accommodations are not as good as they might be. Camping, hunting, and fishing parties to the higher Mogollon country frequently make this a stopping place, and the ladies of the party enjoy themselves here while the men folks go up into the mountains after large game, which can be found in abundance.

SILVER CITY.

The county seat of Grant County is located in a pretty mountain valley surrounded on all sides by rolling hills, which serve to protect it from high winds. The altitude is 6,021 feet above sea level; the average yearly rainfall for a period of twenty years was 14.18 inches; the mean annual temperature is 55°, the average for the summer months being 72°. On the coldest of winter nights the thermometer rarely falls lower than 12° or 15° above zero, while the days are always temperate, ranging from 45° to 70° in the middle of the day.

In summer time the thermometer ranges from 70° to 90° during the day, seldom reaching 96°, while the nights are delightfully cool, having an invigorating effect upon the system. These temperatures, taken in connection with the dryness of the atmosphere in this latitude and at such an altitude, renders it one of the most delightful climates of the world, its recuperative and health restoring properties being attested by thousands who have come from other climes to enjoy its beneficial effects.

It is a thriving and prosperous town of 3,500 inhabitants, the American element largely predominating. The population of Silver City will, in point of intelligence and education, compare favorably with that of any town of like size in the world, and it is fully equal, if not superior, to any community in the United States as a law-abiding body of citizens. Larceny, burglary, and kindred crimes are comparatively unknown, while civility and politeness mark the demeanor of all whom you meet.

It is one of the most substantially built towns in the United States, brick and stone being used exclusively—not a frame building within the city limits. There are four churches, Methodist, Episcopalian, Catholic, and Presbyterian, each of the edifices being a credit to the congregations which built them.

The educational facilities are better than in most towns of similar size in the Eastern States. The first public school in the Territory was organized here, and to-day has a very large attendance. Besides the public school, the Territorial normal school is located here. The institution is one of the best in the country, its fame as a thorough training school for teachers inducing pupils from other States and Territories to come here to complete their education and training in their chosen profession. The Sisters of Mercy conduct the Academy of Our Lady of Lourdes, where many Catholic children receive a liberal education under the beneficent care of the good Sisters.

Silver City is the supply point and distributing station for a large area of territory, which thus becomes tributary to it. It is thus rendered a very prominent mercantile as well as financial center, and a great amount of business is done by the merchants, as also an enormous volume of financial exchanges is transacted through the medium of the Silver City National Bank, a conservative banking house wherein all the most approved business methods are in vogue.

The city has a first-class waterworks system, as well as an electric-light plant of the latest improved design, each owned and operated by a private corporation. All of the most modern conveniences and luxuries of civilization are enjoyed by the residents of Silver City.

DEMING.

The second town in population and commercial importance of Grant County has 2,000 inhabitants. It is a port of entry for cattle and other imports from Mexico. It has a fine schoolhouse and a good corps of teachers, and the attendance is quite large. A very large area of cattle-raising country, extending 50 miles south to the Mexican boundary line, is tributary to this city of the plain, as also the following mining camps find here their base of supplies and mercantile center: Hachita, Volcano, Apache, Tres Hermanas, Cooks Peak, and Florida. It has two churches with comparatively large congregations, an opera house, waterworks system, with the purest water found in any town in the world, and all modern conveniences.

The town site is laid out upon one of the most attractive and desirable plateaus of the Southwest, having an altitude above sea level of 4,800 feet. Situated as it is at the junction of two great continental railways—the Atchison, Topeka and Santa Fe, and the Southern Pacific, which span the continent—and the Sierra Madre and Pacific, and the Sonora, Sinaloa and Chihuahua roads now under active construction, which will afford practical means for the development of the great industrial resources of the States of Sonora, Chihuahua,

and Sinaloa, in northern Mexico, it is especially designed to offer every inducement to the various manufacturing interests of the country, the best facilities for handling the enormous amount of traffic growing out of the development of the great mineral, agricultural, and pastoral resources tributary to Deming.

Commercially considered, the location gives to the town superior advantages, and the completion of the Southern lines of railroads into the Republic of Mexico, in connection with those already established, will give to Deming the prestige of being a center of wealth, of commerce, and manufactures in a Territory whose area is an empire in extent, the resources of which embrace every known article used by civilized man.

MINES.

The mountains, which occupy fully one-fourth of the area of the county, are pregnant with all of the minerals and metals most useful to mankind. Gold and silver have been produced from the mines for a quarter of a century past, while Grant County is proud of the distinction of having the oldest copper mine in the United States—the Santa Rita del Cobre, which was worked by the Spaniards more than a century ago. Enormous veins of the richest and purest iron occur at several places, hundreds of tons of the ore being shipped daily to the iron and steel works at Pueblo, Colo., and to smelters at other points.

Ranking first among the mining facilities of Grant County should be enumerated the Silver City Reduction Works. This smelting plant, which one year ago was handling 60 tons of ore per day, has grown in capacity, as it has grown in favor with the miners of the Western States and Territories, until it now has a capacity of 240 tons per day. It draws its ore supplies from all parts of New Mexico, from Arizona, Utah, Colorado, California, and Old Mexico. This rapid progress and success is due to honest, capable, and efficient efforts of the officials in control of the concern. The works are owned by the Hearst estate, with Bev. Risque as president of the reduction company and S. E. Bretherton as general manager. It gives the miners a home market for their ores and saves the cost of transportation to distant smelters.

By the use of very recent improvements, patented by members of the company, the cost of smelting has been reduced to the minimum, and the saving thus made is shared with the miner, which in a great measure accounts for the rapid growth of the works.

SANTA RITA.

The copper mines of this district are proving to be of phenomenal richness and extent. This wonderful body of ore is without parallel in size, and the percentage of copper greater than in any large copper mine known. Geologically, it is an isolated occurrence, conforming to none of the heretofore conceived ideas of formation of ore bodies.

The area occupied by this enormous mass of ore is fully 1 mile square, the entire mass being ore which can be profitably worked, with the exception of three small vertical bands of quartzite which contain no ore. All the balance of this great mass is ore, and ore of superior quality to the average of the copper-producing mines of the world. These mines gave employment to 400 men from January until June of this year, and many thousands of tons of rich ores were extracted,

many carload lots giving returns of from 60 to 75 per cent copper, while the average of all ore shipped was a fraction over 20 per cent copper. In June the property changed ownership, being purchased by Messrs. Rockefeller, Burrage, and associates for a cash consideration of $1,400,000. A corps of mining, mechanical, electrical, and civil engineers and experts are now upon the ground making plans for the erection of one of the most complete plants ever erected for the extraction of copper. It is safe to say that upon the completion of these works Santa Rita will rank among the greatest copper-mining districts of the world.

These mines are the oldest in the United States, having been worked by the Spaniards from the early part of the present century until the Territory was ceded by Mexico to the United States. Millions of pounds of copper were extracted and the metal shipped, on mules, to the City of Mexico. Two of the old forts, erected by the Spaniards for defense against Indians, are still standing, and the old dumps at the mine cover hundreds of acres, demonstrating the extent of the great excavations below. In later years the mines were worked intermittently by Americans, many of the ventures being failures on account of being harassed by the Indians, one firm losing nearly $250,000 by raids of the redskins. And thus these mines had an eventful though not always a prosperous career, until two years and a half ago when Arthur E. Dawson took charge as general manager of the property for J. Parker Whitney, of Boston. By indefatigable effort and economical management, without a dollar of capital, he put the mines on a paying basis. The dividends from the property continued to grow larger and the mines to attract more and more attention from capitalists until they finally purchased the property at the figures given above, and now it bids fair for Grant County to have at Santa Rita the greatest copper mine in the world.

PINOS ALTOS.

The old Spanish records in the custody of the Mexican Government at the city of Chihuahua tell of the discovery of gold at Pinos Altos by Gen. Pedro Almendaris, one of the early commandantes of the Mexican fortress at Santa Rita, distant 12 miles east, and where were situated the famous Santa Rita copper mines. The first discovery of gold by Americans was made on May 18, 1860, by Messrs. Birch, Shively, and Hicks. The camp was first called Birchville, in honor of Birch, who was the first to find the precious metal. Within six months 700 men were in camp looking for the gold lucre. In 1861 quartz mining was commenced, the Atlantic and Pacific lodes being located. Many other quartz veins were immediately located, the ores being reduced and the gold recovered by grinding and amalgamation in arrastres. From twenty to fifty arrastres were kept in constant operation until 1866, producing in the neighborhood of $300,000. Adding to this the gold produced from the placers, and the total of gold produced in the first five years would amount to over $500,000. Considering the crude facilities for operating the mines and the perpetual dread and uncertainty caused by frequent Indian attacks, it was a remarkably good showing. In 1866 a 15-stamp mill was erected by Virgil Marston. This, the first modern machinery in the camp, was quickly followed by other mills of the same kind, which were kept in constant operation upon the oxidized, free-milling ores from the surface of the veins. As depth upon the veins was attained the sulphureted

ores were encountered, which proved a serious obstacle to the amalgamation of the gold by the processes then in vogue.

In 1883 concentration of the sulphurous ores was attempted by Messrs. Place & Johnson, but the process was a failure for lack of experienced operators. In 1884 Peter Wagner made a success of the concentration process upon the ores of the camp, and the same year Messrs. Bell & Stevens purchased and put in successful operation the Place & Johnson concentration plant, which had heretofore been pronounced a failure. From that time until last year the ores have been worked by amalgamation and concentration of the tailings, the concentrated product being shipped to the smelting works.

The several claims upon the Pacific vein which were purchased by the Hearst estate two years ago have been systematically exploited, under the superintendency of B. B. Thayer, an experienced mining engineer. Several shafts have been sunk upon these claims, one of them having attained a depth of nearly 1,000 feet below the upper workings at the apex of the hill. The ore body exposed is probably the most continuous, both vertically and laterally, that has ever been developed in any gold mine. The width of the vein varies from 6 inches to 10 feet, while the gold value will average about an ounce per ton. A pipe line has been built to bring water from the Gebhardt Springs, 8 miles away. A mill of 60 tons capacity is now in course of construction and has an assurance of a long and successful run, as more than sufficient ore to keep the mill steadily employed for five years is now blocked out and ready for extraction. It is probable that the mill capacity will soon be increased, if it be found that the water supply is sufficient. In the meantime a 10-stamp mill is working steadily upon the ore extracted in development work.

The Atlantic and Deep Down mines are being developed by Gillig & Co., of New York City, who purchased the properties from the Treasure Mining Company, a Denver corporation, that worked the property for two years at a good profit.

The Golden Giant, Rathburn, Langston, and other properties have been constant producers of gold bullion for many years and have added their share to make up the millions which the camp has produced.

HANOVER.

This camp is a mineral wonder, both as to variety of ore and extent of ore bodies. Here are found enormous veins of iron from 10 to 50 feet in thickness. From two of these mines the Colorado Fuel and Iron Company are shipping 200 tons per day, and this output will be largely increased on the completion of the railroad to the mines, which will be about October 15, 1899. Large quantities of copper ore are being shipped from the Modoc group, the Humboldt, Hanover, and numerous other mines. Manganese occurs in large quantities, and lead ores have been profitably mined here. Like its close neighbor, Santa Rita, its greatest wealth is in copper, the production of which is increasing at a rapid rate.

CENTRAL.

This district really comprises within its boundaries the mining camps of Santa Rita and Hanover, but the name is more especially applied to designate the locality immediately contiguous or within a few miles of the town of Central. Here are found several lead, silver, and gold mines. The principal mines of the district are the Texas and Grand Central, owned by the Bayard Milling and Smelting

Company, a company of Philadelphia capitalists, represented by H. Niles as resident manager. These mines have been developed to a depth of 500 feet, showing a large vein of ore rich in gold and silver and proving the permanency and value of the veins of the district in depth. A concentration mill upon the mines is being successfully operated.

OTHER MINING CAMPS.

Chloride Flat, 3 miles from Silver City, has produced over $3,000,000 in silver; even at the present depreciated price of silver several of the mines are paying well.

At Alhambra, the Alhambra mine is being worked and very rich silver ore is being extracted.

At Victoria, large bodies of high-grade lead ore have been extracted from the mine which gives its name to the camp. Wolframite, a rare and valuable mineral, is also found here.

At Stein's Pass, Granite Gap, Hachita, and Volcano rich lead and silver mines are being opened and are producing large profits.

At Gold Hill, the Reservation, Standard, Nancy Lee, and other gold mines are producing bullion.

At Paschal, in the Burro Mountains, several copper mines are being profitably worked for the higher grade ores, which are shipped to the smelters, while other very large bodies of lower grade ore are awaiting the advent of capital to erect suitable reduction works upon the ground, when these ores can be mined and copper produced at a very large profit.

The prospects for the immediate future of Grant County could not possibly be brighter. Prosperity reigns throughout the county, no boom nor excitement, but everything on a substantial and paying basis, with still greater prosperity assured from day to day as the resources of the county are developed more and more.

GUADALOUPE COUNTY.

Guadaloupe County, the banner grazing county of the Territory, with hundreds of thousands of acres of land of the very finest for settlement, offers unexcelled opportunities to the home seeker. Almost the whole eastern part of this county, embracing part of the so-called staked plains, is covered with the finest of grama grass. Water is found within a few feet of the surface, and it needs only the master hand of man to create a veritable paradise here.

As a sheep country Guadaloupe County is ahead of them all. The finest improved Merino herds are found here, and the wool produced is without doubt the finest in quality and strength of staple. Next to the sheep industry comes that of cattle, both of which are successfully carried on in this county.

The agricultural crops of Guadaloupe County are alfalfa, fruit, and cereals. Apples and pears here excel in flavor and size, being similar to fruit raised in California.

As yet little efforts have been made to develop irrigation enterprises. In this direction most excellent opportunities are offered, especially at Fort Sumner, where 12,000 acres of land could be irrigated at nominal cost.

Puerto de Luna, the county seat of Guadaloupe County, has a $20,000 court-house, several large stores, good schools, and about 1,500 people, and is the center of a fine stock and agricultural section.

The Pecos River, with its excellent ditch system, furnishes an abundant water supply to this section of great promise.

The climate is mild and the altitude is such (being about 4,000 feet above the level of the sea) that a more desirable locality can not be found anywhere for sheep and stock raising. Sheep raising has been a most important industry here, particularly with the native people. Cattle raising is fast becoming one of the principal industries, and it is meeting with much favor and success.

The mineral lands found in this section embrace gold, silver, copper, coal, and iron. Coal has been found, and is of good quality.

Oats, potatoes, barley, and timothy are chiefly grown, and the ranch houses and homes for live-stock raising are numerous. As a live-stock country this locality is specially adapted to the raising of horses.

But as a pleasure and health resort this locality has become famous. The scenic effects are grand. The country is wild and broken, and much game abounds, including bear and deer, while the streams are literally alive with mountain trout running as high as 5 pounds in weight.

Splendid pine forests cover the mountains and mesas, and the timber industry is a most important and growing one, and in the near future, with some investment of capital, Guadaloupe County will come to the front in the development of her resources.

LINCOLN COUNTY.

Lincoln County is situate in the southeastern portion of New Mexico, and embraces an area of nearly 5,000 square miles since the last division of it, when the entire southern portion of it was set off to the new county of Otero.

The general surface of Lincoln County is comparatively level, but broken here and there by detached ranges of mountains, rendering it one of the most desirable, as well as picturesque, portions of the Territory of New Mexico.

The climate of this section is an ideal one, being far enough south to avoid any very severe cold weather during the winter, and the altitude, combined with the cooling rains which almost invariably prevail through July and August, render outdoor life peculiarly delightful during the summer and fall, and make it a veritable "promised land" for the home and health seeker.

This county at present has a population of about 9,000 inhabitants and an assessed valuation of $1,608,226, or a fraction over $24.72 per capita. When we take into consideration the fact that it is almost universally conceded that the assessment rolls never represent more than 60 per cent of the actual value of the property, these figures make an extremely favorable showing as to the financial standing of the people in this county.

The principal industry thus far has been the raising of live stock. The ranges in this section are well sheltered by foothills and numerous belts of timber, and the grass is abundant and nutritious, so that stock thrive well the year round, making cattle as well as sheep raising here not only safe but highly profitable. The latest estimate, made just prior to June 1, 1899, places the number of cattle on the ranges of the county at 41,046 and their value at $451,511. This, however, can not be considered a fair showing, as most of the ranches had made their usual spring shipments prior to the time the list was

made out, one firm alone having shipped 28,000 head of cattle in March previous, which was more than one-half the total estimate in June.

Of sheep there were 64,390; goats, 7,787; horses, 2,780; mules, 102. There were also 257 burros and 4,148 hogs in this county listed for taxation. Owing to the long distance from a suitable market but little attention has heretofore been given to agriculture. Only enough grain and vegetables have been raised to supply the local demand. The county now has 10,883 acres of land under cultivation, the larger portion, of course, lying along the watercourses and subject to irrigation, though in certain localities, notably along the eastern foothills of the White Mountains, a large tract has been producing abundant crops for the past five years without any moisture whatever except that retained by the soil from the winter snows and the annual rains. There can be no possible doubt that deep plowing, with subsoiling and thorough cultivation, would cause much of the land in this region, especially that contiguous to the mountain ranges, now classed as "arid," to grow most of the cereals and all kinds of vegetables at a very fair profit. No finer fruit, either in size, quality, or flavor, can be produced in any country than that gathered from the orchards around the White Mountains in Lincoln County. Now that a market has lately been opened up by the coming of the railroad, fruit raising will receive much more attention, and in a few years will form quite an item in the freight shipments to El Paso and other points.

The phenomenal success of the Coe Brothers, on the Rio Ruidosa, A. C. Austen and P. G. Peters on the Rio Bonito, Mrs. S. E. Barber on the Three Rivers, and many others throughout the county, has stimulated other ranch owners in their vicinity to plant extensive orchards with the best varieties of fruit trees adapted to the soil and climate, so that the time is not far distant when the valleys and even waste places will burst forth into a fragrant cloud of peach and apple blossoms.

Lincoln County is, perhaps, more abundantly favored by nature than any other section of equal scope in the Southwest. Aside from its vast areas of grazing and agricultural lands, which are as yet but little more than half utilized on account of an inadequate supply of surface water, its other resources are enormous. From the Gallinas Mountains on the north to the White Mountains on the south, a distance of about 80 miles, there lies a practically inexhaustible mineral belt. There is not a mountain range within its border where the precious metals, in some form, do not crop out on the surface. This fact has been well established for years, but the long distance from any line of railroad communication has prevented the development of these vast resources of wealth, as the transportation of other than gold ore was made impossible.

Only in cases where the deposits have proven to be so enormously rich that they have paid for their own exploiting from the surface down, and a dividend besides, has the work been prosecuted with any kind of system or continuity. It can be safely asserted that no mine in this whole mineral belt, with one or two exceptions, is being worked at the present time where the output of the mine itself has not paid the expense of operating and development, together with the cost of machinery for reducing the ore.

The Old Abe mine at White Oaks is an example in point. This mine is now down to the 1,200-foot level; no water has yet been encountered, neither is there any intense heat perceptible. This is probably the deepest dry mine in the United States. At this great

depth the vein is less broken than near the surface and carries about the same amount of free milling ore with a large increase in the value of the refractory ore. It has always paid a handsome profit over the ordinary mining expenses when systematically and economically worked. During the past year the present management has purchased a coal mine, and put in working order for supplying the necessary fuel a 50-ton cyanide plant to work the tailings as they come from the mill, with many other improvements, and the mine has paid for them all with ore taken from development work, as but little sloping has been done.

The North and South Homestake mines in the same district are down to the depth of 1,000 feet and 600 feet, respectively, with a large amount of underground development work, and always paid a handsome dividend when properly managed.

The Lady Godiva, Little Mack, Rip Van Winkle, and many other mines in the White Oaks district, have been exploited sufficiently to show that they are of about the same character as the mines already demonstrated by deep workings.

In the Jicarilla Range, 12 miles northeast of White Oaks, the gulches are full of placer gold, estimated at several million dollars, but as yet are worked only in a crude, spasmodic way, owing to the scarcity of water, which has to be hauled several miles in order to obtain the gold by panning. This when obtained is rather coarse and almost pure. A plan is now on foot to pipe the water from the Capitan Mountains, a distance of 21 miles, in sufficient quantity to wash out this gold by hydraulic process.

In the Gallinas Mountains, still to the north, there are many fine prospects carrying copper carbonates and sulphides; also lead carbonates and galena, carrying as high as 40 per cent lead and 20 per cent silver per ton. This is comparatively virgin ground on account of the long distance from any base of supplies and the expense of shipping ore.

In the central eastern portion of the county is the El Capitan range of mountains almost entirely unprospected, although some very fine ore, carrying both copper and gold, has been located in that region.

The Nogal and White Mountain ranges, in the southern end of the county, contain a veritable network of mineral-bearing leads, much of it low grade, it is true, but in immense bodies, which, after all, are considered the more valuable in the eyes of experienced miners. Among the more productive mines in this Nogal district might be noted the American, where its original locator, Billy Gill, ground out a fortune with the aid of a mule and an arrastra; the Hellen Rae, from which old man Rae carried a gunny sack of ore down to his cabin daily and pounded out enough yellow metal in a mortar to wear a silk hat and a syndicate smile the remainder of his days, and then sold the claim to St. Louis parties for $10,000. The owners have since put in a reduction plant.

The Hopeful, generally called the Parson's mine, where a mountain of low-grade ore lies dormant because the heirs could never agree to work it themselves or fix a price on the property so that its volume of gold may be added to the whole product.

This whole vast mineral belt, which in its entirety contains almost every known mineral, is now open to the world. It never has been thoroughly prospected. The land practically belongs to the General Government, and perfect title can readily be obtained, as there is not a land grant in Lincoln County.

The building of the El Paso Northeastern Railroad into the heart of this region has stimulated all manner of enterprises more than any event in its history, and many fortunes will be made here in the next few years by those who have the courage to venture and the capital to invest.

In addition to the precious metals, there are in the vicinity of White Oaks, which is the natural business center of the county, ledges of black, gray, and white marble over a mile long. Here, as well as at the Salado and in the Jicarilla Mountains, are immense bodies of iron ore running from 50 to 70 per cent. Nature, to more especially endow this portion of the great domain, has underlaid 200 square miles of it with a vein of bituminous coal, the quality of which can not be excelled west of the Mississippi River. Openings have been made in these coal measures at White Oaks, at Salado, and at other points, sufficient to prove their quality and continuity. Inside of two months this county will be supplying El Paso and the Southwest with fuel of a very superior kind at greatly reduced rates. So cheaply can this coal be mined that at White Oaks the very best quality is being delivered to consumers at $2.75 per ton.

In the county there have been forty-three school districts already organized, and there are 1,438 children of school age.

At White Oaks is a school building which was erected at a cost of $10,000, with four rooms furnished. Nogal, Lincoln, and Picacho each have public school buildings suitable for two departments. The other districts are all supplied with school buildings of fair capacity. For the past few years much interest has been taken in educational matters throughout the county, and the per cent of illiteracy is growing rapidly less each year.

Being in direct communication with the outside world, this long isolated region will now receive a great influx of money and capital to aid in developing its unlimited resources and to uncover new mines of wealth.

As to the climate, the General Government settled that when it established a marine hospital at the Old Fort Stanton Military Reservation, near the geographical center of the county, where it proposes to test the agency of mild and pure air, tempered with the greatest amount of ozone, in the treatment of tuberculosis.

SALADO COAL FIELDS, IN LINCOLN COUNTY.

The present terminus of the El Paso and Northeastern Railroad will be Gray, a village in the center of the Salado coal fields, Lincoln County, N. Mex. Here are thousands of acres of coal, connected by a railroad to a region where coal is at a premium—the region surrounding El Paso.

As soon as the railroad became a certainty men were put to work at once in the Salado mines, and many tons of coal are now waiting the welcome whistle of the locomotive to be carried to El Paso, where the market is sure and steady.

The coal is excellent for steaming purposes, and is destined in time to be used most exclusively by the different factories and smelters in Pass City, and also in the northern and interior of the Republic of Mexico.

The railroad having now reached the coal fields, it is expected that within six months from this date more than a thousand miners will be working in the Salado district.

MORA COUNTY.

The county of Mora is bounded on the east by Union County, on the north by Colfax, on the south by San Miguel, and on the west by Rio Arriba and Taos counties. This county has an area of over 2,000 square miles, consisting of well-watered and as fertile and productive agricultural and horticultural, as well-grassed pastoral, as rich mineral, and as densely wooded timber lands as can be found in any other locality in the great Southwest.

A choice of remunerative occupation is offered to either the farmer, gardener, or stockman; or, should the home seeker prefer to prospect for mineral, or be a lumberman, he can find among the mountain ranges of the western portion of the county, on Government land, free and open to all comers, sufficient inducement for that necessary labor which accumulates wealth in bringing to light the hidden treasures of the hills or in felling the giants of the forest.

The eastern portion of this county, all public domain, is entirely devoted to stock raising. The great plains lying between Union County and Red River support numerous herds of sheep, aggregating hundreds of thousands during all the year. This immense stock range is well watered, and, with sufficient shelter afforded by the many brakes and canyons, comes near to being the stockman's ideal of what a summer and winter range should be. The grass is black gramma, well known to be the most nutritious of grasses.

From Red River westward the country is broken by cedar-clad hills and open parks and glades; is dotted with picturesque stock ranches and small farms until the lower valley of the Mora is reached at Cherry Valley, from which point to the head waters of the Mora River large tracts of land are farmed, and all under irrigation systems, yielding heavy crops of alfalfa, the principal forage plant grown. Other crops successfully raised are meadow hay, oats, wheat, corn, and, in fact, all small grains give a greater return per acre in bushels, and many more pounds to the bushel, than any of the famous wheat or corn States.

From Watrous to the western boundary line of Mora County, on all the streams and throughout all the many beautiful valleys, very large amounts of grain and hay are annually harvested. Las Vegas is yet, and has been for decades, the principal market and distributing point for all crops raised in the upper Mora and tributary valleys, as well as the receiving and distributing point for all material timbers used by the Atchison, Topeka and Santa Fe Railway and sent for hundreds of miles north and south over its line.

The town of Mora is the county seat, and is situated in the midst of extensive valleys, thickly populated with prosperous and industrious inhabitants, the visible evidence of whose labor contributes in a marked degree to the prosperity of the community at large, and with the remarkable result that not less than 40,000 wagonloads of products from farm and forest, and of merchandise, agricultural implements, etc., are exported and imported annually.

As yet railroad communication between Mora and the outside world is lacking, but recently there has been incorporated the Las Vegas, Mora and Taos Railway Company, with principal office at Las Vegas, which intends to link those towns named in its title and bring them into close connection by means of a standard-gauge electric railway, thus giving to Mora all the advantages of being practically on a trans-

continental line, through Las Vegas, on the Atchison, Topeka and Santa Fe Railway, as a gateway. The early construction of this line is almost an assured fact.

The opportunities for investment in Mora County are unsurpassed in the Rocky Mountain regions. To either the large or small capitalist, the millionaire, or the "man with the hoe" there are presented openings for the safe employment of money which will, in manifold manner, repay all judicious outlays.

With the construction of the proposed railway will immediately follow the installation of immense beet-sugar refineries, canning establishments, flour and oatmeal mills, planing and saw mills, and various other important industries, raw material for which will come from the surrounding country. One item alone, i. e., pease, will furnish to a cannery over 1,000,000 pounds per annum, equal to as many cans as pounds, and of as fine a quality and delicious a flavor as any imported French pease. The Mora pea can be bought for 1 cent per pound, and it requires but little arithmetical effort to figure between the cost and profit on an article at 1 cent per pound for raw material and 25 to 30 cents per can for the merchantable product. Beans in great quantities are also grown in all the valleys of western Mora County, and they will assuredly prove an additional industry to that of canning pease, especially as the New Mexico market is now clamoring for both of them. A very heavy export business can be transacted, and both canned pease and beans will readily sell in all Eastern cities.

The La Cueva Ranch Company has successfully proven the entire suitability of the Mora Valley soil for sugar beets, and a year or two ago planted a small tract, which produced the astonishing yield of 22 tons per acre, which, on analysis made by the chief chemist at the Territorial agricultural station at Mesilla Park, N. Mex., and by the chief chemist of the Agricultural Department at Washington, D. C., showed 19.7 per cent and 19.4 per cent of saccharine matter per ton of beets. The La Cueva Ranch Company has a standing offer to supply the crop off not less than 3,000 acres of beets for a first-class refinery located anywhere in the immediate vicinity of the ranch, which would be two-thirds of the tonnage required by a 100,000-ton plant. The tonnage lacking for such establishment can be easily furnished in close proximity, and an excellent opportunity is hereby opened to large capital to come and invest.

The amount of oats annually raised in the Mora Valley alone often exceeds 10,000,000 pounds, while 2,000,000 pounds of wheat is regarded as only a moderate yield. The following is about as the crops are annually—sometimes more, sometimes a little less:

Wheat	pounds	2,500,000
Oats	do	8,000,000
Corn	do	500,000
Hay	do	2,000,000
Alfalfa	do	1,000,000
Sheep	head	100,000
Wool	pounds	500,000
Pease and beans	do	2,000,000
Lumber	square feet	2,000,000
Piles	linear feet	200,000
Railroad ties		200,000
Cattle	head	2,000
Imports of merchandise, agricultural implements, etc	pounds	4,100,000

But in this connection it is only just and right to state that the area

of land actually under the plow is but a mere patch compared to the whole area of the county, which statement is necessary to explain what would otherwise appear an extreme paucity of agricultural products. There are at least 500,000 acres of rich lands lying idle and uncultivated, all of which can be put under irrigation systems in the valleys of the Mora, Rio de la Casa, Sapello, Manuelites, Cebolla, Coyote, Rito, Agua Negra rivers, and several minor streams, all of which rivers and streams carry strong heads of never-failing water.

Fruits of all the hardier varieties grow both wild and in orchards in extravagant profusion; they also offer special inducements for the establishment of preserving or canning works.

In minerals the various sorts in constant demand for smelting purposes are abundant. Some of the finest specimens of copper ore ever brought forth from the treasure vaults of the Rocky Mountains are to be obtained in western Mora County. There is also gold-bearing ore, iron, galena, and other sorts awaiting exploitation and intelligent work of the prospector and miner to show their extent.

Coal of a semianthracite character has recently been discovered in apparently inexhaustible measures, which are of sufficient thickness and of such excellence as to establish their commercial value beyond all peradventure. When railroad transportation has been provided, Mora County coal will become known all over the West as a strong competitor in "black diamonds" with any other portion of the country.

The population of Mora County is not less than 17,000 souls. Its assessed valuation is about $1,200,000, being probably only one-third of the actual value.

The altitude runs from 6,000 feet above sea level to 10,000 feet, or perhaps a little higher on the mountain peaks.

The climate is similar to the rest of the northern part or plateau land of New Mexico, and surpasses that of any other country on the face of the globe for counteracting and curing all sorts of pulmonary complaints.

The scenery in the mountains is acknowledged to be superior to the Swiss Alps by those people who have seen both.

The hunter's paradise and the fisherman's ideal for trout fishing is here to be found; the many mountain streams abound in speckled beauties, while game, both feathered and furred, small and large, roams the hills on all sides.

The home seeker can purchase lands already under cultivation for $20 per acre and upward. Farming pays when such lands will readily and constantly yield 50 bushels, or 3,000 pounds, of wheat per acre, which is now selling on the ground at 1½ cents per pound, and never less than 1 cent, with a surety of no failures in crop on account of irrigation.

Many other farm products are raised in this county, and of late years potatoes have been most successfully grown; so much so as to enter into active competition with both California and with Greeley, Colo., bulbs in the home markets.

Vegetables of almost every known variety are grown throughout all the valleys and on all the farms in Mora County. Cabbages of 40 to 50 pounds in weight, as solid and sound as can be imagined, are common results of the gardener's toil. The soil seems peculiarly well adapted to onions, carrots, parsnips, turnips, radishes, and lettuces, and garden truck of all sorts attains speedy maturity, taking the place of and driving out of local markets all importations of vegetables from better-known parts of the West, on account of the superior flavor of

the home-raised article. Celery flourishes in this county; large quantities can be raised for export in addition to meeting local demand.

In natural but as yet undeveloped resources Mora County can produce a great and varied abundance. Excellent clay for brickmaking; red and white sandstone; limestone; products of the forest, white pine, red and white spruce, cedar of sufficient growth for electric, telegraph, and telephone poles, and many other trees of commercial value all grow in great quantity and of remarkable thriftiness.

There is enough timber in western Mora County to build a railroad round the earth; enough white spruce to supply a very extensive paper mill, or several of them, with raw material for years to come. There is coal in endless amount for fuel for manufactories, canneries, beet-sugar refineries, etc., and raw product sufficient to supply their demands and keep them steadily in operation from the very moment they are ready to commence.

Excellent natural wagon roads, kept in good repair, cover the county with a regular network. All means of travel and transportation are now maintained by vehicles only, except where the Atchison, Topeka and Santa Fe Railway cuts across the country from Wagon Mound to Watrous, some 40 miles of line.

There is no county in New Mexico which presents so diversified a field for the safe employment of capital in large or small sums as Mora does. Good management, abundantly aided by fertile soil, permanent water for irrigation, and intelligent farming, will produce almost incredible results. The land requires no artificial fertilizer, as the water used in irrigating attends to renewing the soil every year, or just as often as irrigation is given the lands and the crops.

To first realize and afterwards appreciate what Mora County can show and offer to the world, personal inspection and investigation are absolutely necessary, as its most fruitful portions and choicest locations lie remote from the present railway and are not seen or even heard of outside their immediate environs.

M'KINLEY COUNTY.

The legislature of 1898–99 for the Territory of New Mexico by an act created the county of McKinley out of a part of the county of Bernalillo, which new county of McKinley will embrace all that portion of the county of Bernalillo lying within the following boundaries:

On the north the south boundary line of the county of San Juan; on the east commencing at a point where the south boundary line of the county of San Juan intersects the range line between ranges 8 and 9 west of the New Mexico principal meridian; thence south between ranges 8 and 9 west of the southeast corner of township 14 north, range 9 west; thence along the west boundary line between townships 13 and 14 north, ranges 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, and 21 west, to the intersection of said line with the west boundary line of the Territory of New Mexico; thence north along the said boundary line between the Territories of New Mexico and Arizona to the point of beginning.

Although this new county has been created as above set forth, it will not be fully organized until January, 1901. Gallup will be the county seat. McKinley County is located in a rich coal-producing section of country. In fact, nearly the entire county is underlaid with coal and will undoubtedly in time be one of the richest counties and the most prosperous in the Territory, as it has numerous resources and advantages enough to make it so.

In the town of Gallup, the county seat, there are located the Crescent Mining Company, the Caledonia Mining Company, and a number of other large mining companies, employing hundreds of men. The coal mined is shipped to California, Arizona, and Old Mexico. There are also the Mulholland and Casna Mining Company, and United States Senator Clark owns and operates successfully a large mine about 5 miles west of Gallup. There are a number of other parties operating mines, the details of which will be found by reference to United States Coal Mine Inspector J. W. Fleming's report contained herein.

In addition to the immense and inexhaustible coal beds, there has also been discovered coal oil and deposits of asphalt in this county, which, however, have not as yet been developed to any great extent. This county is traversed by about 80 miles of railroad.

OTERO COUNTY.

Otero County, which was created in February of this year by an act of the thirty-third legislative assembly, has experienced a more remarkable growth than any region in the Territory since the locality came under the domination of the United States Government. The erection of this young empire is directly due to the efforts of C. B. and J. A. Eddy, railroad promoters, who induced Pennsylvania and New York capitalists to push a railway across 100 miles of barren and dust-choked plain to the Sacramento Mountains and tap a region previously devoid of market and destitute of shipping facilities, but prolific of all manner of farm products, fruit, timber, and minerals. The expenditure essential in reclaiming the locality from its primeval solitude aggregated over a million dollars, but the investment is already proving remunerative beyond the anticipations of the capitalists who furnished the money for the work.

The county is 6,912 square miles in dimension and contains 192 townships, or 4,423,680 acres. It is divided into the following classes of land: Land irrigable by artesian or pumped water, 1,228,800 acres; stock range, 2,584,320 acres; White Sands Desert, 138,240 acres. The Mescalero Apache Indian Reservation occupies 465,720 acres, or 738 square miles.

AGRICULTURE.

The high plateau of the Sacramento Mountains covers an area from 60 to 70 miles in length and 15 miles in width, and is a wonderfully productive agricultural country. Farmers are rapidly settling the locality, and they find a ready market in the county for all manner of farm and ranch products. Every ranchman is evidently in prosperous circumstances, for the railway has brought a market to their very doors, and the distance is so far to other markets that they have practically no competition and can command top prices for everything that they raise. The amount of land now under cultivation aggregates 1,500 acres, situated in the following portions of the county: Mescalero Indian Agency, 1,600 acres; Penasco region, 1,800; Fresnal Canyons, 1,300; Three Rivers, 800; Tularosa Canyon, 800; Sacramento River Valley, 600; Tularosa and vicinity, 400; Agua Chiquito, 400; Weed, 400; La Luz Canyon, 350; La Luz and vicinity, 200; Elk Spring Canyon, 200; Silver Spring Canyon, 150. It is estimated that there is fully 100,000 acres of fine farming land in the county that can be utilized for ranch purposes without irrigation. In the mountain

region no irrigation is required except for cabbage plants and tender vegetables, which demand water before the spring rains commence. Wells are now being bored for artesian water, and when it is secured over a million acres of land in addition to that already available will be reclaimed for agriculture.

FRUIT GROWING.

The valleys and plains in the foothills and adjacent to the Sacramento Mountains furnish one of the best fruit-growing countries in the United States. There are now 23,500 fruit trees and 24,000 grape vines producing fruit in the county. The fruit trees are located in the following various places: Three Rivers, 5,000 trees; La Luz and vicinity, 8,500; Tularosa, 4,000; mountain country, 6,000. The Tularosa country has 15,000 grapevines; La Luz, 6,000, and Three Rivers, 3,000. Previous to this year there was no way of getting the fruit to market, and each season's crop was a total loss except for the small amounts required for home consumption. From time to time a few of the orchardists tried to dispose of their crops by hauling them over the rough mountain roads to Roswell, Eddy, White Oaks, Nogal, and El Paso, distances varying from 80 to 120 miles, but the cost of transportation and the time required in disposing of the fruit made the experiment unprofitable. With the railway facilities now available it will be possible to dispose of each season's crop without any difficulty, for the market embraces the whole Southwest, and the climate is such that a vast amount of fruit is required. Very few of these now engaged in fruit raising understand horticulture, but the methods employed in California and other great fruit-raising sections will come into general use here when the profits to be made in the business are realized. So far the trees here have been free from scale and destroying insects, and the total demolition of a crop by frost is unknown. There is less loss and risk attached to the fruit business in Otero County than anywhere else in the West. The fruit raised is remarkably large and luscious, and the flavor unexcelled. As an evidence of the remarkable worth of the region as a fruit-growing section, it may be well to call attention to the condition of one orchard at Three Rivers. In P. Coughlan's orchard this year the peach trees are so heavily laden with fruit that the branches of the trees are touching the ground, and in many instances have been broken. The peaches are from 3 to 6 inches in diameter, and it is estimated that this small orchard of less than 3,000 trees contains 200,000 pounds of peaches. They sell for 5 cents per pound on the El Paso market, and the crop, if marketed, would represent to him $10,000. Some of these peaches weigh as much as 19 ounces, and an exhibit at the World's Fair gained for them the premium. Apples from this orchard have been found to weigh 29 ounces. One tree contained 6,000 pounds of fruit. Marked success has attended the efforts of fruit growers in the higher mountain country, and apples do especially well there.

CATTLE GRAZING.

Otero County, with its abundance of water and 4,038 square miles of range, furnishes an ideal spot for the stock grower. There are now owned by residents of the county 39,500 head of cattle, and it is estimated that fully 50,000 head, owned by large companies having home ranches in adjoining counties, feed here. The large cow outfits that formerly occupied the range exclusively have for the most

SAWMILL AT ALAMOGORDO, OTERO COUNTY, N. M.

part disappeared, and the stock are now owned by numerous small stockmen, who are in a generally prosperous condition. With the price of stock advancing, the cattle industry of Otero County represents a neat figure in wealth.

SHEEP AND ANGORA GOATS.

The high table-lands and prominent foothills of the Sacramento Mountains furnish excellent pasturage for sheep and goats, and the business is being adopted by a number of newcomers in the county. There are 39,860 sheep in the county, and 12,000 Angora goats. The sheep men figure large profits from the business, and there is promise that it may become an important factor in the industries of the county. The county is such topographically that there is no danger of the sheep and cattle men coming in conflict with each other's interest.

TIMBER RESOURCES.

The timber belt of Otero County is estimated to be 20 by 80 miles in extent, containing the heaviest timber in the region from the Mescalero Indian Agency south to the headwaters of the Sacramento River, including the Toboggan, Weed, and Penasco countries. The Alamogordo Lumber Company is doing an extensive timber business in the mountains, and its operations will furnish timber for two large sawmills that are located in the town of Alamogordo. The force of men working in the woods numbers 135 at present, and it is the intention of the lumber company to double it as soon as possible. The shipments amount to 80,000 feet of timber per day, and experts state that the supply can not be exhausted in 50 years, even though the output be doubled. The extensive operations of the company furnish lumber to the El Paso and Southwestern market at a much less figure than Louisiana and Texas concerns can provide it. From Toboggan, the timber-shipping station of the lumber company, narrow-gauge railways have been run for a distance of 7 miles to the summit for facilitating the timber operations. The canyons are narrow, and hills steep, and the cost of working the timber is reduced to the minimum by the construction of slides from the top of the hills to the railway tracks below. The wages paid in the lumber country range from $2 to $3 per day. The timber averages in size from 18 inches to 2 feet in diameter, and occasionally timber is cut that is too large for the band saws of the mills to handle. One of the largest trees felled measured 6 feet 1 inch in diameter, and made ten 16-foot saw logs. Pine, white spruce, red spruce, and oak are the classes of timber most abundant. The red spruce furnishes the largest timber.

The two sawmills at Alamogordo have each capacities of 100,000 feet of lumber per day. A factory in connection with the mills is planned for the manufacture of sash, doors, blinds, moldings, and everything used in house building. The mills are equipped with the very best machinery, and every particle of the timber is utilized in the work. The slabs are worked into pickets, boxing, lath, wainscoting, etc., and the bark and sawdust are used for fuel in generating power for the mills. The construction and mechanical arrangements of the mills make it possible for them to manufacture lumber as cheaply as can be done elsewhere.

The company is now selling lumber as cheap as it can be produced in New York, Pennsylvania, and other places in the East, and cheaper than in Illinois, Iowa, and Nebraska. The quality of the lumber

averages sounder, stronger, and better in every respect than Eastern lumber. The company has an investment of over $500,000 in the lumber business in Otero County.

COAL FIELDS.

The matter which first attracted the attention of the Eastern investors to Otero County and induced them to furnish an outlet by rail for its resources was the coal measures of the Salado basin, located 160 miles from El Paso. After a thorough examination of the Salado, White Oaks, and Tularosa plateau coal fields, it was decided that the best coal available was to be found at Salado. There is a great quantity of coal in the White Oaks and Tularosa sections, but the veins are thin and badly disturbed by volcanic action. In the Salado an exceptionally fine quality of coal is found and the veins are thick and the coal intact. Three seams have been opened, two of which are bituminous and coking, 55 and 62 inches thick, respectively, and a third vein of anthracite coal, 40 inches thick. The Salado basin is from 10 to 15 miles wide and the coal measures underlying it are pronounced by experts to be much more regular than the coal fields of Pennsylvania. It is estimated that there is a sufficient quantity of coal there to supply the Southwest market for at least fifty years. Heretofore, coal and coke have been brought to El Paso from distances ranging from 320 to 550 miles, but the building of the El Paso and Northeastern Railway through Otero County places the Salado field within 160 miles of the distributing point, and the haul is practically down grade all the way. The opening of the coal fields means much more than the mere furnishing of cheap fuel to El Paso, for it will also aid materially in developing the precious metals found in Otero County by furnishing mining operators with fuel at a reasonable rate.

PRECIOUS METALS.

The Jarilla mining district is now the most important mineral field in Otero County. Since the railway reached the locality development work has been carried on extensively and now heavy shipments are made from the Nannie Baird, Lucky, and other properties of lesser importance. The gold, copper, silver, and lead ore shipments from that county are of such magnitude that an Eastern company has seen fit to erect a smelter near the El Paso and Northeastern Railway tracks in El Paso, and they confidently figure on drawing their mineral supply principally from Otero County. Recently a rich placer field, 2 miles square in extent, was opened in the Jarilla Mountains, but the workings so far amount to but little on account of the scarcity of water. A number of the miners who are prospectors in the region, have ordered dry washers, and will attempt to work the field as soon as they arrive. Prospecting and development is continuing steadily in the White Mountain, Three Rivers, and Tularosa districts, and many astonishing finds have been made, but the development is not such at this time that the geological conditions of the regions can be dilated on. The railway company reports a constant increase in the ore-shipping business from the county, and positively expects the road to be one of the heaviest mineral-shipping roads in the Southwest as soon as the properties are more thoroughly developed. The railway company is assisting the development of the Jarilla district by offering a rate of $1 per ton on ores running $10 or less and then a graduate freight scale according to value of the ores.

NANNIE BAIRD MINE, JARILLA, OTERO COUNTY.

MINING AT JARILLA, OTERO COUNTY, N. M.

THE WHITE SANDS.

The White Sands Desert, which occupies the extreme western portion of Otero County, is in reality an immense gypsum bed, which will some day form an important item in the wealth of the county. The sand hills resemble huge banks of snow, and on the west of them is found an old lake bed covering 100 square miles area, the bottom of which is composed of layers of crystallized gypsum, some of the crystals being 8 to 10 inches in length. The lake bed deposit for the most part is fibrous and sectile, like mica. The west winds have evidently blown the crystals about for many years, the friction pulverizing them and forming the huge hills on the east. In some places in the lake bed mounds of gypsum, composed of successive layers, are found 15 feet in height, which demonstrates that a bed of gypsum at least 15 feet in depth has been removed by the winds. The sand hills proper vary in size from small mounds to hills 20 feet high, and miniature mountains in ranges and isolated peaks, set off with valleys and canyons, are features of the scene, which is picturesque indeed. There is neither plant nor animal life in the center of the sands, but along the outskirts vegetation flourishes. The constant shifting of the sands kills and prevents plant life from taking root in the desert proper. Along the borders cottonwood trees are found which measure 8 inches in diameter. The soil is very moist, and it is found especially good for the growth of peppermint, large tracts of which are found growing there wild. An analysis of the sands, made at the agricultural college in Las Cruces, gave the following results:

	Per cent.
Gypsum	0.97
Calcium carbonate (lime)	2.68
Magnesium carbonate	.06
Magnesium sulphate	.12
Potassium sulphate	.07
Sodium carbonate	Trace.
Sodium chloride	Trace.

Experiments made with the sands for fertilizing purposes found it to be especially adapted to that use. The plant-growing qualities of the sands is exceptionally good. The experiments at the agricultural college demonstrated that the application of white sand in considerable quantities improved any soil a great deal. In addition to the uses mentioned above, the sands are valuable for the manufacture of plaster of paris and its various by-products. Sulphuric acid, which is largely used in leaching copper ores, can be manufactured from the sands, and with the advantages of cheap power, in consequence of cheap fuel, the great desert 20 miles west of the town of Alamogordo will some day be utilized in commerce and be found a source of great wealth.

RAILWAY ENTERPRISES.

The railway enterprises begun during the past year in Otero County include the El Paso and Northeastern, which is now 160 miles in length and still in progress of construction; the Alamogordo and Sacramento Mountain Railroad, which is completed from Alamogordo to Toboggan, a distance of 20 miles, and a narrow-gauge timber railway from Toboggan up the various canyons of the Sacramento Mountains—about 9 miles in length. The El Paso and Northeastern Railway was built for the coal business of the Salado Basin alone, but various resources never before thought of have been developed with the building of the

road, and now it is enjoying a good freight and passenger business. The Alamogordo and Sacramento Mountain Railway shows some of the most intricate work of broad-gauge railway building in the United States. Maximum grades of 5.2 per cent and 30° curves are features of the road. A splendid agricultural and timber country was opened by this road, and the shipping business already demonstrates that the enterprise was justified. In all probability another railroad from Alamogordo to the White Sands, and from thence to the San Andres mining district, will be built as soon as developments in those regions warrant the move.

THE IRON INDUSTRY.

In at least a dozen places along the line of the El Paso and Northeastern Railway, in Otero County, deposits of superior ore, suitable for the manufacture of Bessemer steel, have been found. Cheap coal and coke will place the iron industry of this county on a plane with other localities, and then New Mexico, Texas, and the whole Southwest will be supplied with the home product. The iron ore has been tested at some of the largest steel works in the United States and is shown to be superior to the Colorado product. When the time arrives for the thorough exploitation of the business, New Mexico will find one of her principal industries located in this county.

SCHOOLS OF THE COUNTY.

Since the organization of the county, two different school superintendents have been appointed, but neither would undertake the work of attending to the enumeration of the children or apportionment of school funds, and the matter will not be attended to until the October meeting of the board of county commissioners. Alamogordo has a private school with an average attendance of 75, and the public schools will be established in less than two months. As an evidence of the increase in the number of children of school age in the past year, the Fresnal district (district No. 15) furnishes a startling example. Last year the enumeration of the children in that district showed 29. This year it is 225. The same ratio of increase will be found in every district that is adjacent to the railroad, and in every farming and fruit section and town. Inasmuch as there is no school superintendent to attend to this matter now, it is impossible to give accurate figures relative to the schools.

LABOR SUPPLY.

The labor supply of the county is low. Men for railroad work, timber work in the wood, lumber men for the sawmill, etc., are scarce, and several crews have been imported during the past year from Pennsylvania, Louisiana, Chicago, and other places.

CLIMATIC.

Climatically, the conditions of Otero County are very similar to those existing in other localities of a like altitude in New Mexico. The United States Government has placed the stamp of its approval on the section as desirable for tuberculosis patients by the establishment of a merchant-marine sanitarium at Fort Stanton, on the northern border of the county. The dryness of the atmosphere in the lower country and the lack of precipitation makes it especially desirable for the treatment of that disease.

SCENE ON THE ALAMOGORDO AND SACRAMENTO MOUNTAIN RAILROAD--"THE CLOUD CLIMBING ROUTE."

ALAMOGORDO.

Alamogordo, the county seat of Otero County, has experienced the most remarkable growth of any city in the Territory. Less than a year ago the town was established, and it has to-day over 2,000 inhabitants, broad streets, an excellent assortment of splendid brick storehouses, well stocked with merchandise; three churches, two large sawmills, costing over $200,000; an electric-light plant, ice factory, a water-works system which cost $50,000, railway hospital, and commercial men's club. The general offices of the El Paso and Northeastern Railway are located here, and the company will also erect a round-house and machine shops at an early date. The county has the erection of a court-house in view, and fully 20 fine two-story residence houses, costing from $2,000 to $10,000, adorn the place. It is estimated that over half a million dollars has been spent in improvements in the city during the year.

WEALTH AND POPULATION.

It is difficult at this time to arrive at a correct idea of the taxable wealth of the county, for the work of the assessor has not been completed since the organization of the county, but the amount will exceed $950,000. The census rolls show a population of about 3,500, and it is constantly increasing. The El Paso and Northeastern Railway is directly responsible for the increase in population, business, and wealth of the county, for the opening of the region has given employment for almost unlimited capital, and a great amount of labor in the timber and mining regions, and has furnished homes for thousands of farmers, stockmen, and people engaged along commercial trade lines. The live-stock, agricultural, and other industries have been increased wonderfully, and the competency and energy displayed in bringing about these results is worthy of the highest commendation.

TULAROSA.

NEAR THE FOOT OF THE WHITE MOUNTAINS, AN IDEAL PLACE FOR HEALTH-SEEKERS, AND A REGION RICH IN AGRICULTURAL, FRUIT, AND MINERAL RESOURCES FOR THE HOME-SEEKER.

A climate which will effect a cure for pulmonary complaints is the one great desideratum for which persons afflicted in that respect have traveled the whole world over. It is generally conceded that a place having a mild and uniform climate, linked with the pure air of a high mountain altitude, is the place which consumptives should seek, and all of these necessary attributes are to be found in Tularosa, Otero County, N. Mex.

This little town, which is in southern New Mexico, is on latitude about 33° north, is situated at the base of the White Mountains, whose highest peak, about 25 miles distant, rises 12,000 feet high, and the town itself has an altitude of 4,000 feet above the level of the sea. It is supplied with water by the Tularosa Creek, which is a mountain stream whose sources consist of several mountain springs containing iron, magnesia, and sulphur, on the reservation of the Mescalero Indians, flowing for about 20 miles through the canyon dividing the White Mountains and the Sacramento ranges. These mountains are covered with pine, fir, juniper, pinon, and balsam fir, all of which endow the atmosphere with a healing balm beneficial to the lungs. The balsam fir furnishes a resin pleasant to the taste and much used among the mountain dwellers for coughs, sore throats, and similar complaints. The temperature ranges from the freezing point to 94° F. This is the record for eighteen years. The thermometer reaches its highest point about the middle of August, when for about two weeks it reaches 94° at noon and remains there until 3 p. m., when it begins to decline, and at night the breeze sets in from the mountains, which renders a blanket necessary before morning. The large number of old cottonwood trees which line the streets of Tularosa furnish dense shade which makes the warmest days pleasant and agreeable. The real winter weather usually lasts from about the 20th of December until the 10th of January, and then ice can be seen in the irrigating ditches from one-eighth to

one-quarter of an inch thick, but never strong enough to bear a boy's weight. Tularosa being completely landlocked against the winds on the north and east by mountain ranges and spurs from the main ranges, never experiences those sudden changes of temperature which are so severe on lung troubles.

New Mexico as a fruit region has already been greatly advertised, and the fruit of all kinds raised proves her high standing for fruit culture. Tularosa does not fall behind any other portion of the Territory in the cultivation of apples, peaches, pears, apricots, nectarines, figs, grapes, and wine making from the "Mission" grapes. Apples measuring from 4 to 6 inches in diameter are raised in Tularosa.

The tourist and hunter will find many attractions in the vicinity of Tularosa. The mountain landscape and wonderful "mirage of the desert" to be often seen in Tularosa Valley, are things worth going far to see. Six hours' ride will take the hunter among the wild turkey, black-tailed deer, and cinnamon bear, and a day's drive in a buggy will take the disciple of Walton to where the speckled trout are greedily awaiting the angler's bait.

A large area of the United States public lands is still vacant in the vicinity of Tularosa. That they are rich and fertile is proven fully by the yield of all the lands under cultivation in this section. But irrigation is necessary. Turn water on the land and it will produce anything grown in the temperate zone and many of the products of the Tropics. The mountain streams furnish water in limited quantity only during the dry season, but enough goes to waste and is lost during the winter months to irrigate a country as large as the New England States if it were only stored in reservoirs, where nature has almost provided them—the mountain canyons. Movements are now on foot to effect that object. The mountain ranges near Tularosa contain large deposits of gold, silver, copper, iron, and coal yet undeveloped.

Tularosa is about 100 miles from El Paso, Tex., situated on the El Paso and Northeastern Railroad. The company is constructing a modern two-story depot, with rooms upstairs for the agent. The road is being rapidly pushed on to the Salado coal fields, in Lincoln County. These fields are extensive and a large force of men are now employed on development work. When the road is completed to this point an era of prosperity will follow all along the line, not only in the development of the coal mines, but also the gold, copper, and other minerals, which abound in the region penetrated by this road. There is also an unlimited amount of timber in this region. To those seeking for health, we say come and breathe the dry mountain air of Tularosa, charged with the life-giving ozone, and warmed by a southern sun. To the tourist and pleasure seeker we say, come and hunt the deer, the bear, the wild turkey, and fish in the mountain waters. To the capitalist, we say, come and examine the greatest opportunities for irrigation enterprises which the country affords. As a mineral and mining country, this section is coming to the front, and mining men are coming here almost daily to examine and report on mining propositions. It will only be a short time until the facilities for shipping ores will be good and claims that have not been worked heretofore will be good properties. And to the homeless one who may desire to avail himself of the United States land laws, we say that in the vicinity of Tularosa lies the largest body of unappropriated public land now left out of the almost boundless public domain, subject both to homestead and desert entries. Now is the time for the landless to take advantage of the opportunity offered.

INDIAN RESERVATION TO BE OPENED.

Directly tributary to the El Paso and Northeastern at Three Rivers and Tularosa is the western portion of the Mescalero Indian Reservation which will soon be thrown open for settlement. The bill to that effect has become a law, and the Indians have taken their lands in severalty, so that all that is required now is the final proceedings to its opening.

The western portion of this reservation is well known to be a rich mineral section, the value of which is greatly increased because of its proximity to the railroad. The rich agricultural country to be thrown open will be a revelation to the many hundreds of people who will seek homes there in a short time. With plenty of water and rich, fertile soil, it is destined to become the great farming area of the Southwest.

In regard to the healthfulness of the section, the Government has

PAVILLION, CLOUDCROFT, OTERO COUNTY.

set its seal upon the climate by establishing a sanitarium for those of its soldiers engaged in the Navy who are afflicted with pulmonary troubles. This will be the great consumption sanitarium of the world, where, it is thought, will be received all who have become afflicted with the dread disease and who desire to try the benefits of a glorious climate combined with the best medical treatment known.

LUMBER DISTRICTS OF THE SACRAMENTO MOUNTAINS IN OTERO COUNTY.

By means of the Alamogordo and Sacramento Mountain Railroad the magnificent forests of pine trees which exist in these mountains are opened up and made easy of access.

The great extent of these forests is such that, even at the present rate with which lumber is being taken from them, many years must elapse before any appreciable diminution in the supply can be detected.

In the heart of this vast forest, upon the summit of the Sacramento Mountains, is situated the noted resort of Cloudcroft, where 2,000 acres of wild woodland, replete with many surprises in the way of scenery and cozy nooks, is set apart as a park, where hundreds of tired people may find rest during the hot summer months in the cool, balmy air of the mountains.

A good dining hall upon the grounds furnishes meals to those who, while camping out, do not care to endure the heat and other vexations connected with cooking.

The Sacramentos can well be called the sportsman's paradise, as they abound in game, such as turkey, grouse, deer, bear, mountain lion, wild-cat, etc.

RIO ARRIBA COUNTY.

Rio Arriba County lies between the counties of Santa Fe, Taos, San Juan, and Bernalillo, and is bounded by the State of Colorado on the north. Its area is about 4,500,000 acres, of which over 2,000,000 are available for farming and pasturing purposes, agriculture and stock raising being the occupation of seven-tenths of the population, which, according to the last official census, is 11,534, although a recent estimate places it at 19,000.

EDUCATION.

The county of Rio Arriba has as many, if not more, public schools than any other county in the Territory of New Mexico, and all are well conducted and largely attended. There are 42 school districts, with an enrollment of over 1,283 pupils and an average attendance of 878 males and 405 females.

The principal towns of this county are Tierra Amarilla, the county seat, with a population of 2,000, a fine court-house, modern-built jail, three good stores, and a branch of the Denver and Rio Grande Railroad. The other principal towns, which are all thriving, are El Rito, Chama, and Monero, the last being a coal-mining town.

Irrigation is practiced wholly, there being no less than 40,000 acres under ditch.

There are two very extensive and exceedingly fertile valleys, the Rio Grande Valley, and the vast strip of land along the Chama River from its source to its junction with the Rio Grande, 3 miles above Espanola. These are the fruit regions of this county, and the water for irrigation of the fruit lands is furnished by the Rio Grande and Chama rivers.

MINING.

The mining industry is also carried on very extensively in Rio Arriba County. Rich galena ore has been found running $40 in silver and 30 per cent in lead within 8 miles of the Denver and Rio Grande Railroad, which railroad crosses the county of Rio Arriba in its northern part from east to west. Gold has been discovered at Tierra Amarilla in good paying quantities; copper and coal very rich has been found in the neighborhood of Abiquiu covering an area of 16,000 acres. There are now three mining districts, i. e., Good Hope, Eureka Gulch, and the Headstone, within the county, which are considered by mining experts equal in rich ores to the famous Creede district of Colorado.

VALUATIONS.

The value of property is $907,176. There are 1,550 head of cattle, valued at $13,002; 127,869 head of sheep, valued at $103,725.85; 1,082 horses, valued at $14,023, and 67 mules, valued at $1,571.

FRUITS.

Fruit of the very finest flavor is grown in this county; is free from defect and is very abundant.

SAN JUAN COUNTY.

San Juan is the northwest corner county of New Mexico, is about 75 miles square, comprises 3,542,000 acres and lies just south of the reservation, bordering its entire length. Aztec is the permanent county seat of San Juan County, and is situated in the center of the great Animas valley, flanked on either side by the fertile valleys of the San Juan and La Plata rivers. It is in the very heart of the greatest fruit belt and richest producing agricultural district in the whole Southwest. It is the central and general distributing point for the mail routes of San Juan County, and the emporium of trade and business for northwestern New Mexico. Its business and professional lines comprise three large general stores, two hotels, one hardware store, two millinery stores, one newspaper, two blacksmith shops, one livery stable, two saloons, one harness shop, one meat market, two attorneys, two physicians.

Aztec has a fine two-story brick school building and a large, commodious church building (Presbyterian). A substantial wagon bridge across the Animas River near town has recently been completed. A roller flour mill of 50 barrels' capacity daily, equipped with modern machinery and operated by a splendid water power obtained from an irrigating canal, is the latest addition to the enterprises of the town. The Territorial government has established an agricultural experimental station at Aztec and has spent about $7,000 on buildings and grounds, and the last legislature made provision for its future maintenance.

WATER SUPPLY.

San Juan County is traversed by three large rivers, which head in the snow-capped mountains of southwestern Colorado, and furnish a never-failing water supply for irrigation, under which system all successful farming is conducted. These rivers are: The San Juan, about 270 feet wide, with an average fall of 11 feet to the mile, and with a mean flow of 3,200 cubic feet per second of time; the Animas, 150 feet wide, with an average fall of 21 feet to the mile, and a mean flow of 2,000 cubic feet; and the La Plata, about 30 feet wide, with an average fall of 40 feet to the mile, and a mean flow of 250 cubic feet.

RESOURCES.

Nature has indeed done much for San Juan County. With a fine and healthful climate, it has thousands and thousands of acres of rich, level, fertile lands, and an everlasting water supply for all purposes. Large and inexhaustible fields of coal, with veins from 4 to 16 feet thick, crop out at the surface.

SAN JUAN VEGETABLE BOUQUET.

What makes San Juan County the finest county in New Mexico and the future great country of the Southwest is—

First. One of the finest climates on earth.

Second. Lands as rich and of as wide an extent as any country can boast,

Third. Its everlasting water supply and the ease with which it can be applied to the lands.

Fourth. The capacity of the soil to raise any kinds of crops in enormous quantities and of the finest qualities.

Fifth. The finest fruit-producing country east of California.

Sixth. The fine stock-grazing land of the higher lands and mesas and the close proximity of mountain ranges for stock in summer and the enormous crops of alfalfa hay that can be produced so cheaply for winter feed.

Seventh. The profitable production of live stock, cattle, horses, sheep, hogs, chickens, bees, etc.

COST OF HOMES.

It is estimated that not one-twentieth of the available tillable lands are yet under irrigation and cultivation. Of the lands already under irrigating ditches and subject to immediate irrigation not one-fifth is in use or cultivation. Thousands of acres of rich, fertile land, with perpetual water right, ready for use and cultivation, lying idle and unused, can be bought as raw lands with water rights at from $10 to $15 and $20 per acre, while improved lands with houses and fencing and productive orchards can be bought at from $20 to $25 and $30 per acre, owing to location and improvements. Thousands of acres of rich, level lands lying on the upper valleys and mesas, yet vacant and subject to entry under the public-land laws, can be irrigated with larger canals and ditches to carry the water.

PRODUCTS.

Entering the Animas Valley, in San Juan County, after leaving the Ute Reservation, the visitor sees well-irrigated ranches, with bearing orchards and alfalfa and grain fields of unsurpassed productiveness. Alfalfa yields three and in some cases even four crops per year, and, in addition, furnishes pasturage throughout the winter. Wheat, oats, barley, rye, potatoes, and sugar beets yield as well as in the other most favored regions. Small fruits of all kinds do well, the grape is much more prolific than in the famous California vineyards, while orchard fruits are of superlative quality. The large, sweet cherries commonly sold throughout the country as California cherries thrive here. The pear here finds its most congenial home. The apricot, almond, nectarine, and peach grow to perfection, and the apple, king of fruits, is beyond compare. Almost every farm on down from the reservation line throughout the county has its orchard. The older orchards produced 15,000,000 pounds of apples in 1898, and the quality of the fruit has established for it a recognized place in the great markets of the country. Pear blight, grape rot, apple scab, and the many other enemies and afflictions of fruit culture in the States of the Union are as yet unknown in this favored section.

The pasturage and water supply of the high mesas in the mountains north are ample for the summer range of vast herds and flocks, which in winter are fed on the valley farms. The sheep and cattle interests are already very extensive and are destined to form the basis of the agricultural wealth of the county.

THE OTHER TOWNS.

This article would be incomplete were not some mention, however brief, made of the many other towns and settlements of the county, possessing, as they do, innumerable attractions and a future pregnant with untold possibilities. Chief among these is Farmington. The fame of Farmington as a great fruit-producing center is widespread. The town is situated at the junction of the three rivers, the San Juan, La Plata, and Animas. It has several hundred inhabitants and is constantly and rapidly growing The oldest orchards in the county are located near here. The soil is rich, the improvements many and substantial, and the people progressive to a degree.

Fruitland, Jewett, and Olio are numbered among the growing towns along the lower San Juan River. They are highly thrifty and prosperous and deserve a visit from the intending settler. Cedar Hill, on the Animas near the State line; Flora Vista, also on the Animas, 7 miles below Aztec; Bloomfield and Largo, on the San Juan, and the La Plata settlement along the productive and progressive valley of the La Plata River, complete the list of San Juan's embryo cities.

A WORD TO THE HOME SEEKER.

When you visit the opening of the reservation you may not get what you want. You will find some of the choice land already allotted. You may find other active, energetic people just ahead of you and the most favorable locations gobbled up by the most fortunate land seekers in the scramble for choice locations, but do not get discouraged. You have come to the Southwest to fully investigate. You want to change locations; you may have weak lungs or throat trouble or be suffering from catarrh or rheumatism; you are perhaps from the slow, go-easy, overcrowded East, and you are wanting a vacation among the strange and diversified scenes of the great West; you want a home of your own with rich soil and plenty of water, and one that will produce anything that grows; and you want a change of climate from the hot, sultry summers of the Eastern and Middle States and from the cold, long winters with their many grievances. Do not get discouraged because you may not get what you want on the reservation. It may not suit you; there may be too much mountain and too little valley. Come right on down across the reservation into San Juan County, N. Mex. Come to Aztec, 38 miles south of Durango, where the Animas River basin widens out into a beautiful broad valley with thousands of acres of the most fertile lands. Remember that it is only 10 miles from Aztec across to the great valley of the San Juan River and only 12 miles across west to the beautiful valley of the La Plata. Remember that while we are only 38 miles south of Durango, we are entirely out of the mountains, among the foothills, and in the broad valleys, and more than 1,000 feet lower in altitude.

There is nothing on the reservation that beats our country. We have better land and more of it. We have more water and it is easier handled to irrigate with. We have all the building stone and all the coal and fuel we need. We have a much lower altitude and a better climate. We have big orchards that have been tried and are found fruitful. We have good schools and churches, good society and good people. We have plenty of cheap lands that can be bought on long time at a low rate of interest, and we have just started a great big empire that has more rich natural resources than any other tract of land of its size in the United States. We want more good, industrious people to help us develop its many rich resources and make homes that mean both independence and fortune in the future in the growth and prosperity of this favored country. Do not get discouraged if others are ahead of you in the reservation. Just beyond is the promised land. Just over the border is the famous San Juan. Just down the river is the great Animas Valley that offers the finest homes in the finest climate for the least money, with the best surroundings of any locality in all the great Rocky Mountain region.

SAN MIGUEL COUNTY.

San Miguel County is larger than the State of Massachusetts and has a population half as large as the State of Wyoming. The topography of the county is made up of mountains in the west part, fertile valleys, and broad plateaus, called mesas, in the central and east. It has every diversity of climate, soil, and scenery, and the great diversity of the staple industries is an ample guaranty of the permanent prosperity of all. Here we have mountain, plain, and valley, the basic conditions best adapted to varied and profitable human energy; mines, cattle, and agriculture, three of the great basic industries of the world all combined, constituting an aggregation of producing industries that underlie and are essential to the successful prosecution of all others.

The Rocky Mountain range, which lies across the west end of the county from north to south, is ribbed with gold, silver, iron, copper, lead, and coal, and yet lacking everywhere of being at all generally exploited.

The great plains which lie between the mountain slopes and the valleys of the streams that cut the county in every section are covered with nutritious grasses and are well supplied with water, and are thus made capable of sustaining vast herds of cattle, sheep, and horses. Many of the valleys are limited, it is true, but practically each of them is of sufficient area to accommodate a neighborhood of farms and capable, with intelligent storage, of supplying all with water for all purposes.

The greatest of all needs of San Miguel County is farmers. Of merchants, lawyers, doctors, politicians, middlemen, statesmen, etc., the supply is fully equal to the present demand; but the farmer, the basis of development and the foundation stone and superstructure of all public prosperity, individual, local, State, and national—the man who tills the soil in rational, intelligent, and successful ways—is the man needed here.

BALING ALFALFA IN SAN JUAN COUNTY.

The native population of this county are natural sheep men and cattle men, and devote all their attention to these profitable industries. In many instances they have their homes located in rich valleys capable of producing large and paying crops, but at the same time import their corn and flour from the Middle States. In San Miguel County there are valleys with ample water, if intelligently used, to supply with wheat, oats, corn, and hay a population of 200,000 people, yet for a lack of farmers there are on an average of twelve carloads of flour, three of corn, and five of oats shipped into this county per month the year around. This is a natural result of the conditions of our industries. The cattle and sheep men are not producers of hay, grain, and fruits, nor do they even raise garden truck, but they buy oats by the ton, and they buy bacon. garden products, and fruit. The miners who delve for coal, copper, silver, and gold are many, and they buy imported products at good prices.

Our prices for grain, etc., are Kansas prices with freight added. For instance, if oats can be laid down here from Kansas or Nebraska, or anywhere east, at $1 per 100 pounds, $1 per 100 pounds is the price of our oats. So our farmers get the Eastern price with a very high freigh, rate added, and thus our grain, our garden and dairy products are better paying than they are in the Eastern States, and our market is at home. I am unable to obtain statistics of the amount of poultry and dairy products imported into New Mexico each month or year, but the amount is enormous, and I think it is perfectly safe to say that nine-tenths of the poultry, eggs, and butter used in New Mexico comes into the Territory by express, and this is for the sole reason that we have not in this country the farmers or small ranchmen to supply us with these necessities, a golden opportunity it would seem for thrifty Americans who desire to come West and locate in the finest climate on earth.

San Miguel County is the center of the two great industries in New Mexico, cattle and sheep raising. Of the 20,000,000 pounds of wool produced annually in New Mexico, 4,000,000 pounds are grown and 8,000,000 pounds are marketed in San Miguel County. This county is also the headquarters of a majority of the cattle men of the Territory. In Las Vegas, the county seat of this county, are located three large wool-scouring plants, each with a capacity of 2,500,000 pounds of wool per year. This home demand for wool is the secret of the good market of this product in Las Vegas.

The Atchison, Topeka and Santa Fe Railroad has 100 miles of track in San Miguel County, and the division headquarters is located in Las Vegas, where the monthly pay roll exceeds $30,000. This road has also a branch line running from Las Vegas to the Las Vegas Hot Springs, where upward of $1,000,000 have been spent in hotels, bath house , and other improvements. It is here that the celebrated Montezuma Hotel is located, said to be the finest resort hotel between Chicago and San Francisco.

San Miguel County is known as the empire county of New Mexico. No combination of circumstances has yet been found powerful enough to direct the wholesale trade of the Territory from its natural center—Las Vegas. The largest wholesale houses in the southwest are located here, while having branches at Albuquerque, Socorro, and other points. Trade for Las Vegas comes by rail and wagon. It comes from the counties of Mora, Colfax, Taos, Santa Fe, Chaves, Lincoln, Valencia, and Socorro, there being more freight unloaded in Las Vegas and more loaded out than in any other city in New Mexico. This is certainly a good and true index of the business done.

Las Vegas, the county seat of San Miguel County and the commercial center of the Territory, has a population of 10,000 people. about equally divided between natives and Americans. In the way of public buildings it has a city hall, five public-school buildings, court-house, Masonic temple, opera house, Territorial normal school, Territorial insane asylum (of red and white cut sandstone), an academy, seminary, Jesuit college, convent school, Presbyterian mission school, Methodist manual-training school, Christian Brothers' institute, and a kindergarten. Two schools of music are also added to her educational facilities.

Las Vegas has two daily and five weekly newspapers, three banks, two building and loan associations, three hotels and many boarding houses, nine churches, a number of clubs, and all the leading civic and social societies, a roller flour mill, capacity, 50 barrels a day; a manufactory of mineral and carbonated waters, two wagon and carriage factories, a saddle and harness factory, electric-light plant, three planing mills, two cigar manufactories, and many other enterprises of less importance.

There are eight wholesale houses, whose trade extends throughout the Territory, while this volume of trade and the value of stocks they carry can not be duplicated west of Kansas City and south of Denver.

An evidence of the healthy growth of Las Vegas can be had from the fact that not less than fifteen new commercial enterprises have been opened here in the past six months.

Respectfully yours,

W. C. REID.

Hon. MIGUEL A. OTERO,
Governor of New Mexico, Santa Fe, N. Mex.

CLIMATOTHERAPY AT LAS VEGAS HOT SPRINGS.

A remarkable combination of natural advantages of a health-giving nature exists in and about Las Vegas Hot Springs. Its location in this regard is peculiar. Situated in the northern portion of the county, it lies on the southern slope of the Canadian Valley, the course of whose waters, differing from that of either of the other valleys of the Territory, is directed toward the Mississippi. The main range of the Rockies forms the western boundary of this valley. A limb of the Rockies extends at about right angles east and west along the Colorado and New Mexico boundary line. The Raton Range is a part of this limb, some peaks of which are 8,000 feet in height. This high western and northern barrier protects the valley in question from the severe storms which arise in the great Northwest, and hence materially modifies the climate which exists within this basin. The protection of Las Vegas Hot Springs is also materially enhanced by the fact that it lies at the western entrance of the Gallinas Canyon, the high hills of the latter forming almost a complete circle about it. The range of hills forming this canyon farther west become mountains of considerable magnitude. All are covered with a heavy growth of yellow pine, pinon, and cedar trees, together with minor vegetation. There is no sufficient dust or sand upon these hills and mountains in condition to be disturbed by winds; hence, at Las Vegas Hot Springs sandstorms are unknown. Its distance from any center of population is such that it is undisturbed by the dust of streets. Through the Gallinas Canyon flows a small river by the same name, and in its immediate vicinity, close to the edge of the stream above referred to, within a confined area, the soil is penetrated from an unknown depth by some thirty hot mineral springs. Within the same field whence arise these springs lies an extensive peat bed, an antiseptic decomposition of vegetable matter, invaluable as a medicinal agent.

If one will study the atlas of 1894 by the Weather Bureau department of the Government, compiled from all the reports of the Weather Bureau stations from the organization of each to the end of 1891, he will observe that Las Vegas Hot Springs is in the center of what is known as the "dry belt of the West." This dry belt, with an irregular, constantly varying outline, extends north and south from the northern part of Texas through Mexico and into Colorado. Following the monthly charts in the atlas above referred to, one will observe that in January the storm line is the farthest away from him, extending about midway between longitude 95° and 100°. The general monthly precipitation throughout this area does not, then, exceed an inch. In February the storm line is seen to approach a little farther west; in March still farther. It is the rule that the western edge of the storm line has reached central New Mexico and Las Vegas Hot Springs in June. This storm line begins to recede in September; by October it has passed out of New Mexico on its eastern course, and the precipitation has again been reduced to a monthly average of only 1 inch. It is noticeable, then, that this dry belt has a rainy season,

during which time a large portion of the average annual precipitation falls. It is observable in studying this storm line that north of the Raton Range, which is the northern boundary of the Canadian basin, it is greater. The storm line more quickly reaches Colorado and more slowly disappears from it. According to these Government reports, the average annual precipitation at Las Vegas Hot Springs is 12 to 14 inches, most of which falls during the summer months. It is further observed that there are few, if any, habitable portions of the United States having an average annual precipitation of less than above. That there should be some precipitation must be recognized as essential to life and comfort.

A study of the latitude of Las Vegas Hot Springs is interesting in this connection. Its latitude is 35½°, the same that exists in the northern part of Africa, including Morocco, Algeria, and Tunis, and also in the northern part of Arabia, portions of the world known to be extraordinarily dry.

While the location of Las Vegas Hot Springs is so favorable as regards its minimum amount of precipitation, it has not the high temperature that is generally found upon such latitude. This is explainable by its position in regard to the Rockies and its altitude, it being 6,767 feet above sea level. It is generally known that the impression prevails among people who have read of this place, but who have not personally visited the same, that because of its southern position the summers are extremely warm; because of its altitude the winters are severe. Life at the springs convinces one that the opposite is true. The southern position, added to the fact that a spur of the Rockies extends east from the main range along the Colorado border, protects it mainly from the northwestern storms and modifies the temperature of the winter months, so that in truth it is usually mild and delightful. The intensity of summer heat prevalent in southern latitudes does not exist in this location, because of the great altitude. It is thus seen that Las Vegas Hot Springs, together with other portions of New Mexico, has a favorable all year round climate.

The springs, the peat, the freedom from dust and heavy winds, the forests of pine and cedar, the natural scenery, the opportunities for out-of-door life, render this place, in particular, especially favorable for such people as are in quest of health. The medicinal value of the springs has been long recognized; their constituents are generally of the saline element. They vary, however, to a considerable degree, sulphur predominating in one, iron in another, lithia in another, sulphureted hydrogen gas in another; free carbonic-acid gas exists in most of them. They are of unquestionable value in numerous affections peculiarly favorable for their use, either external, internal, or both. The temperature of the hottest is 144° F.; most of the springs range in temperature from 122° to 138°. Combined with the peat in about equal proportions, a union is formed inestimable in certain diseases when prescribed in the form of baths.

All these facilities tend to make of Las Vegas Hot Springs what it is endeavoring to become—a health resort upon an extensive scale. It invites pleasure seekers as well as invalids; those who desire a rest from overwork and those who desire recuperation from some long illness. Its climate must be recognized as most favorable for such as have contracted incipient tuberculosis; those who wish to escape the affections due to a heated term of the lower altitudes; those who wish to escape the rigors of winter; those who wish to avoid suffering from hay fever; its waters invite such as are affected with diseases gen-

erally benefited by hot mineral springs. Its sanitation is perfect. Malaria does not exist; sunshine predominates, thus encouraging out-door life and sports of all kinds; therefore to the pleasure seeker as well as to the invalid Las Vegas hot springs offers attractions unsurpassed in the West, and is the property of the Atchison, Topeka and Santa Fe Railroad System, which system has erected numerous buildings at a great cost for the convenience of visitors, and the work of improvement is still progressing. The main building, named the "Montezuma," is a large structure of sandstone, beautifully situated on a commanding eminence overlooking the picturesque Gallinas Canyon, as it opens out toward the rolling meadows, which meadows give the name to the town of Las Vegas, 6 miles distant. From the broad verandas, extending the entire length of the front, east, and west sides of this building, a delightful view is obtained; on the one hand are mountains with their massive shoulders outlined against the skies; in front the little hurrying Gallinas River rushes along filling the air with the distant murmurs of its waters; in another direction the valley is seen to stretch far out to the horizon; little Mexican villages with their adobe houses are scattered on both sides of the stream. In many respects the surrounding country reminds one of Switzerland, and to those fond of tramps and excursions among the mountains it offers an endless variety. Another building just completed is a hospital for the care of those invalids who need quiet and such attention as can not be given in the Montezuma. The bath house and the peat house are prepared for such as require treatment there. Numerous cottages scattered about the plant, along the confines of a large park, are held in readiness for those who desire home life. The Springs Branch of the Santa Fe Railroad affords constant and easy communication with Las Vegas, where it connects with all through trains on the Santa Fe route.

There are other springs and artesian wells near to Las Vegas besides those at the Las Vegas hot springs; the two most celebrated are the Macbeth mineral wells, owned by Peter Roth, and the Onava alterative water springs, owned by Charles Wright; the first, the Macbeth well, is an artesian well of a depth of 338 feet, geologically speaking, in the lower part or bottom of the Jurassic formation and immediately over the Triassic formation, the Triassic forming the bed and bank of this ancient extinct Jurassic sea by curving from under to an anti-incline or uplift at this immediate location. The salts in the water are derived from a bed of seaweeds formed on the coast of this ancient extinct sea by a leaching through the ashes of the decomposed marine plant for ages, extracting therefrom a natural mineral which analysis shows to be a pure sodium or trisodium compound of salts from the algæ and fucus marina, namely, in proportion of sodium chloride, 35 grains; sodium carbonate, 9 grains; sodium sulphate, 1 grain; or 45 grains to each quart of water. These are the principal ingredients or elements of the salts found in the Macbeth mineral water. The water is absolutely free from the other alkalies, such as lime and magnesia, which renders all waters hard and unfit for drinking purposes. It is a most pleasant and palatable mineral water to the taste, and to which the most fastidious do not object; really a beverage after becoming accustomed to it. The trisodium compound is a solvent of mucus in catarrh of the stomach and biliary ducts, also solvents of albumen in the urine and found in Bright's disease of the kidneys; it also corrects the acidity of the blood, of the stomach and urine, such as lactic acid, uric acid, and lithiæma found in dyspeptics

and disordered intestinal digestion, and is necessarily indicated in the rheumatic or gouty diathesis, gastric catarrh, dysentery, constipation, albuminuria or Bright's disease, and of the skin. It aids and promotes the appetite, stimulates the secretions, is antiacid, an eliminant, a diuretic, and a laxative.

Macbeth mineral water is not only known at home, but each week thousands of gallons are shipped abroad.

Onava alterative water, a sulphureted, carbonated, mineral water, incomparable as a system cleaner, blood purifier, and appetizer, is found at a depth of 250 feet, and has a chemical analysis in grains per gallon as follows:

Sodium chloride	3.009
Sodium carbonate	3.807
Sodium bicarbonate	49.356
Potassium sulphide	4.933
Iron sulphide	.503
Silica	.419

Some remarkable cures have been effected by this water, and while Mr. Wright does not make any pretensions at running a sanitarium, there are always from three to a dozen health seekers at his ranch, a few miles from town, who are there for the benefit of the curative qualities of Onava alterative water.

SANTA FE COUNTY.

The county of Santa Fe does not occupy as conspicuously large a place upon the map as some of the other principal subdivisions of imperial New Mexico; but owing to the rare charm attaching to its history, and that of the unique political capital whence it derives its name, its peerless scenic and climatic attractions, and its rich and diversified resources, it naturally takes first rank in interest among its sister counties.

It is the central county of the Territory; is rectangular in form, extends south a distance of 72 miles from the thirty-sixth degree of latitude, and measures 30 miles from east to west; embraces a total area of 1,498,600 acres, of which 975,000 are officially pronounced available for cultivation and pasturage, while thousands of the roughest mountain acres are clothed with fine timber and ribbed with valuable mineral-bearing veins. It is crossed from east to west by the great transcontinental railroad of the Atchison, Topeka and Santa Fe Company, which operates over 70 miles of road in the county, and is tapped from the north by the New Mexico division of the Denver and Rio Grande Railroad, which extends from Espanola to Santa Fe, or 38 miles in the county. Excellent wagon roads also reach all the towns and settlements.

From the summit of Mount Baldy the surface of the county presents a vivid and magnificent panorama of mountains, mesas, and valleys, with numerous streams of limpid water rushing down huge mountain shoulders, over precipices and massive bowlders, into deep and narrow gorges and widening valleys, flashing in the sunlight like ribbons of silver, in their hurried and heedless race to the Rio Grande on the west, and with the lofty mountain peaks of southern and northern New Mexico and even Colorado swimming in the blue air of the dreamy distance. The main range of the Rockies on the east and the Valles and Jemez mountains beyond the Rio Grande on the west shelter this favored locality from violent winds and render the climate

remarkably mild and equable considering that the altitude of the valleys varies from 5,500 to 7,500 feet above sea level. Doubtless this circumstance, together with the fertility of the soil, excellence of the water, plenitude of timber, and the many marked manifestations of rich veins and deposits of gold and silver bearing material a few miles south, prompted the intrepid Spanish explorers to locate a permanent colony and mission at Santa Fe, or the City of the Holy Faith of Saint Francis, as early as 1605. The wisdom of this selection has been plentifully demonstrated during the nearly four centuries that have since melted into the past. With the exception of the twelve years following the bloody and transiently successful revolt of the Pueblo Indians in 1680, Santa Fe has ever since been recognized as one of the most important outposts of civilization and commerce in the southwestern world, being continuously the political and military capital of this region under both Spanish and Mexican rule, and, having witnessed the frontier line of the United States carried thousands of miles out into the Pacific Ocean, still maintains its supremacy as the capital city of New Mexico, the county seat of Santa Fe County, and the most delightful residence city in the Rocky Mountains.

MATERIAL RESOURCES.

The assessed valuation of the real and personal property of Santa Fe County for the current year, excluding the large amount exempt from taxation under the law, aggregates $1,768,150.68, of which Santa Fe's share is placed at $338,155.10. There are about 500,000 acres of public land in the county, subject to entry at Government prices, and 557,880 acres more are included in Spanish and Mexican grants, the titles of which are purchasable at low rates and on easy terms. It may be added further that the county affords about 475,000 acres of good grazing land, partly covered with timber, and about 500,000 acres of arable land, 200,000 acres of which could be irrigated. In the absence of exact data, the land actually being cultivated by means of irrigation is conservatively estimated at 25,000 acres, while probably 20,000 acres more are yearly planted to crops subject to the chances of enough rain in the growing season to mature them. Wherever the valley and mesa lands of the county have been brought under the magic influence of systematic irrigation the results have uniformly proved most satisfactory, and naturally this stimulates enterprise annually to enlarge and extend existing irrigating systems and thus gradually increase the number of acres that can be depended upon to yield regular profits.

This is notably true of the Espanola Valley, in the northern part of the county. Plentifully watered by the Rio Grande and its tributaries, the Chama, Santa Clara, and Santa Cruz, this beautiful valley is now most of it under cultivation and evidences of contentment and prosperity are noted on every hand. The acreage of wheat, corn, oats, beans, and kindred crops increases each year. Alfalfa yields three and sometimes four crops per year. Sugar beets, carrying a very high percentage of saccharine matter, can be readily grown there. The orchards of apple, peach, pear, plum, prune, cherry, apricot, and nectarine trees have for several years been large and regular shippers of the choicest fruits of the earth, and their vigorous and thrifty appearance gives cheering and aromatic promise of multiplying profits in the future. All kinds of small fruits, including strawberries, raspberries, blackberries, and currants flourish.

BASKET OF SANTA FE COUNTY FRUIT.

Several extensive vegetable gardens, where lettuce, radishes, onions, asparagus, green pease, sweet corn, beets, tomatoes, celery, parsnips, and other table luxuries are raised in great profusion and perfection for the mountain markets of northern New Mexico and southern Colorado, have not only proved to be constant bread winners, but surplus producers. So far as productive qualities are concerned, these remarks may be applied to nearly all of the irrigable and arable lands of the county, particularly the Santa Fe, Tesuque, and Nambe valleys.

The distinguished and lamented Archbishop Lamy introduced the culture of choice fruits, flowers, and vegetables into Santa Fe and elsewhere in New Mexico about fifty years ago. The good man lived long enough to witness the complete success of his experiment and personally taste the rare flavor of its luscious results. It was soon found that all the most desirable varieties of temperate zone fruits, including the largest and finest flavored French cherries, could be grown here in perfection and in quantities only limited by the extent of land and available water supply; that the soil and sunshine of Santa Fe would produce roses rivaling those of France and Italy in beauty and fragrance, and that the conditions were peculiarly favorable to the cultivation of all kinds of edible vegetables. It thus happens that the orchards and gardens in and about the capital city are not only veritable beauty spots, either when blushing with sweet prophecies of better things to come or burdened with matured and mellow fruitage, but provide many families with the comforts of life. Some of these orchards and gardens are irrigated from ancient acequias taken out of the Rio Santa Fe, and others are watered direct from the mains of the local water company.

POSSIBILITIES OF IRRIGATION.

The extent of land so far devoted to the twin arts of agriculture and horticulture is comparatively small, because the natural flow of water in the mountain streams is not sufficient during dry seasons to justify taking out much longer or larger irrigating ditches. These streams carry immense volumes of flood water during the months of February, March, and April, when the snow is melting in the high altitudes and the spring rains are in progress, and again become rushing torrents during the heavy rains of July and August; but, coming from precipitous heights and pouring into expanding valleys and plains below, their invaluable surplus is soon absorbed by the porous soil or drank up by the thirsty air. So, during the months of May and June, when most needed for irrigation purposes, the supply of water is smallest. The remedy is obvious. Wisely located storage reservoirs, like those in southern California or in southwestern New Mexico, capable of holding until needed the flood waters of winter, spring, and midsummer, would render it possible to reclaim and make fruitful thousands of acres of as good land as any now under cultivation in the county.

Careful observations in the canyon show that Santa Fe Creek has a flow of 80 acre-feet per day during the months of February, March, and April; that the rainfall in Santa Fe during July and August varies from 2.50 to 3.50 inches, while in the mountains and canyons composing the watershed of the creek and embracing an area of about 50 miles the rainfall during these two months is not less than 6 inches; that the rainfall in September sometimes amounts to nearly 3

inches; and that after the irrigation season closes, or during the months of November, December, and January, there is always surplus water. In the light of these facts, after making liberal deductions for evaporation and seepage, competent hydraulic engineers reach the conclusion that the storage of the flood or waste waters of the Santa Fe would reclaim and render valuable from 20,000 to 25,000 acres that are now arid and practically worthless.

The Nambe, with numerous natural storage basins along its course, carries three or four times as much water as the Santa Fe, and hence is capable of reclaiming fully 60,000 acres. The Tesuque has about the same, and the Galisteo about half the flow of the Santa Fe.

The surplus waters of the four streams named could be conveniently stored and distributed over the Santa Fe plains as needed, and it will be perceived that, without taking into account the Rio Grande, their combined capacity would be sufficient to reclaim over 100,000 acres in addition to the lands they are now watering. These lands can be secured at Government prices, or on most favorable terms of private owners, and considering that their soil is as fertile and easily tilled and only requires water to become as fruitful as lands in the Espanola Valley that annually yield excellent returns and are held at from $30 to $300 per acre, the thoughtful reader will be able to form an approximate notion of the large direct and indirect benefits that would flow from the proposed system of storage reservoirs. It would not only richly reward the capital and energy invested in constructive work, but would prove a blessing to many deserving men by affording them much coveted opportunities to gain good homes and comfortable incomes in this almost ideal climate. Ten faithfully and intelligently cultivated acres, one half planted to the varieties of fruits that flourish so well at Santa Fe and in the Espanola and Tesuque valleys, and the other half devoted to the culture of table vegetables, would furnish ample occupation and support for a family. The small fruits and vegetables would pay well from the very start, while the trees would begin to bear fruit in three or four years. Celery of superior quality, possessing in a high degree the delicious nutty flavor so much prized by epicures, readily grows here, and might be made a source of large and constant profits. Acres of asparagus, cabbage, cauliflower, onions, oyster plant, and parsnips would reward industry. Experiments prove that sugar beets, grading higher in sugar content than those of California and Nebraska, readily grow here, and will be raised on a large scale as soon as the eyes of capital are opened to the wisdom of erecting factories at Santa Fe for their reduction. Fields of alfalfa, wheat, oats, and corn would pay. Irrigated lands are unfailing crop producers. The rapid and successful development of the Cochiti, south Santa Fe County, and other near-by mining districts, with the certainty that the number of consumers there will soon be multiplied to thousands, guarantees the best possible market for all that these lands could produce. What an inviting field for the establishment of colonies. What tempting and unsurpassed opportunities are thus presented to the many invalids who are seeking and finding fresh health and vigor under the benign influences of the almost perpetual sunshine and the pure, dry, rarified air of a region over which skies of the softest blue tenderly bend, as if bestowing a special blessing.

In consequence of the large shipments of cattle and sheep during the past few years, the extensive areas of fine grazing land are not nearly as well stocked as they should be. According to the books of

the assessor, the live stock in the county is classified as follows: Horses, 1,741; cattle, 1,906; sheep, 48,310; goats, 3,793; mules and burros, 510. Clearly the field for stock growers is full of invitation. The experiment of raising goats on a large scale, chiefly for the sake of their pelts, has been undertaken.

MINING—PAST, PRESENT, AND PROSPECTIVE.

In marked contrast with the prolific orchards, fields, meadows, and gardens of the northern valleys and mesas, but even more important and interesting, are the gold, silver, copper, lead, iron, zinc, and turquoise bearing mountains and hills about Cerrillos, Dolores, Golden, and San Pedro, and the great anthracite and bituminous coal measures at Madrid, in the southern part of the county. Unquestionably the gold found in the locality indicated was one of the principal reasons why the Spaniards took such desperate chances to plant and maintain colonies in this county centuries ago. They extensively worked the famous old and new placers at Dolores and Golden two or three hundred years ago, rescuing therefrom several million dollars' worth of gold, mainly by means of the labor of enslaved Pueblo Indians and the rudest possible methods, even obtaining scanty supplies of water by melting snow with heated rocks; and their descendants are still working these inexhaustible deposits of pay gravel by means of "dry washers." Much of the gold is quite coarse. Years ago a nugget was found near Dolores that yielded about $400, and after heavy rains nuggets worth several dollars each are often picked up. Except for the absence of water the stream of gold from these fields would be immense and continuous. Modern skill and enterprise have partly solved the problem by the agency of deep wells and powerful steam pumps, and can be relied upon finally to achieve success in a much larger degree. Artesian-well experiments have so far failed, but confidence is entertained that ultimately an artesian-well flow will be secured. The lodes in the surrounding hills, whence the placer deposits undoubtedly crumbled and washed down, are of inestimable value. Indeed, the range of mountains extending from Dolores south about 8 miles is virtually one vast upheaval of mineralized matter. Cunningham and several other hills of the range are veritable mountains of ore of high enough grade to warrant the belief that the whole mass will be worked when the requisite facilities are introduced.

Some of these lodes were developed to the extent of hundreds of feet many years ago, and there are evidences that much mineral was extracted. It is estimated that gold to the value of $5,000,000 was taken out of the old workings of the Ortiz mine, and the wealth of several of the prominent native families of the Territory can be traced to this source. This mine is now being systematically worked and its free milling output treated at a plant on the ground. In the same vicinity is the Benton mine, from one pocket of which $60,000 worth of ore was mined in a few months some years ago. Adequate reduction works near at hand are needed to make this and other lodes in the Ortiz Mountains steady producers.

At Golden, a few miles south in the same range, are found numerous lodes of gold and silver bearing ore, as well as blanket deposits of lead and iron carbonates that carry both of the precious metals. Several of these lodes are undergoing systematic development, which promises rich results. Tests at small local plants prove that most of the ores will readily yield their values in Huntington mills. Two

miles farther south are the great San Pedro copper mines, showing large bodies of copper ore which pay handsomely at the smelter near by. Owing to litigation the mines mentioned were not worked for several years, but are now being operated under competent management, and both mining and reduction facilities are being increased as rapidly as possible.

Large bodies of silver-bearing lead and zinc ore have been opened at Cerrillos, but the low price of silver and other causes have prevented their being worked during recent years. The workings of the Cash Entry mine are very extensive, and it is understood that great bodies of ore are disclosed that would pay well at the present prices of silver and lead. The large bodies of iron, zinc, and lime will, some day, be in demand. A fine, modern smelter of 80-tons capacity occupies a prominent and desirable site at Cerrillos, but has not yet been blown in.

At Turquesa, a few miles north of Cerrillos, are located the celebrated Tiffany turquoise mines, from which thousands of dollars' worth of magnificent gems have been extracted and shipped to New York. Experts pronounce them superior in purity, luster, and enduring sky-blue color to any produced in the world, surpassing the turquoise of Persia in the exact tint desired. Garnets of rare beauty are also found in the county.

Much prospecting is going on in the mountains near the city of Santa Fe, and some fine-looking specimens of copper, iron, and mica have been brought in, but not enough work has been done to determine whether valuable bodies of mineral have been found.

COAL MEASURES AT MADRID.

The coal measures at Madrid, just south of Cerrillos, show three distinct veins from 5 to 10 feet thick, extending for miles, and are pronounced practically inexhaustible. The output of these veins is remarkably varied, including soft, free coking, noncoking bituminous, semianthracite, and anthracite, and in places natural coke is found. The intimate association of bituminous and anthracite veins appearing in alternate strata in the same mine is a phenomenon not observed elsewhere, and one that deeply interests geologists. Purely practical people, however, are contented with the knowledge that the veins contain enough for many generations to come, and that it is nearly all of superior quality. The mines are operated by the Cerrillos Coal Railroad Company, whose tracks reach the workings, give employment to 554 men, and produce annually about 250,000 tons of coal, worth about $450,000. The anthracite mine produced 25,000 tons, worth $100,000, last year. The company also operates a large coke-making plant near the mines, and finds a ready market for its product at the different Territorial smelters and at El Paso. Right here it may be added that the construction of a mammoth electric plant, for the purpose of generating and transmitting power to operate the Albemarle mine and mill in the Cochiti mining district, is now in progress at Madrid, where the vast accumulation of slack affords unlimited quantities of cheap fuel.

SANTA FE.

The historic city of Santa Fe, seat of the government of the Territory of New Mexico and the county of Santa Fe, enjoys the distinction of being the oldest town and the oldest capital on the American

ST. FRANCIS CATHEDRAL AT SANTA FE.

continent. Its permanent settlement by Europeans antedates the founding of Jamestown and also the landing of the Pilgrim Fathers at Plymouth more than twenty years. The thrilling and romantic incidents composing its story, the protracted and bloody struggles with hordes of savage Indians, the capture and pillage by hostile Pueblos in 1680, the general massacre of missionaries and explorers and flight of the governor and a few followers in the night to El Paso, the reserving of some of the handsomest Spanish maidens for wives of favored warriors, the desecration and destruction of the Christian churches and the restoration of the worship of snakes and stone idols, the reconquest by Diego de Vargas twelve years later, the terrible punishment visited upon the rebellious Pueblos, the change from Spanish rule to the rule of the triumphant Republic of Mexico, the capture by the United States forces under General Kearney and the building of Old Fort Marcy in 1846, the stirring scenes accompanying the distribution of the immense traffic of the Santa Fe trail, the wild deeds of desperadoes and the fabulous hazards at cards in the days before the advent of the railroad, afford the material for an epic poem of deep interest.

Here, so carefully preserved that the marks of its three hundred and one years of age are perceptible, is located the noted "Adobe Palace," which was the official residence of the Spanish and Mexican governors, and since the Mexican war has been the headquarters of all the Territorial governors and secretaries appointed by the different Presidents of the United States. Here is situated the oldest house standing on American soil, and near by is the San Miguel church, first built in 1540 and still used as a regular place of worship. Here stand the beautiful and imposing new capitol building, the massive modern cathedral of St. Francis, the large and enduring stone Federal building, the modern penitentiary of the land, San Miguel College, Loretto Convent, St. Katherine and the United States Indian schools, the New Mexico Industrial School for the Deaf, Dumb, and Blind; Presbyterian, Episcopal, and Methodist churches; the large brick Presbyterian mission school, besides many fine modern business blocks and private residences. Here side by side are object lessons whereby the civilization of the seventeenth and eighteenth centuries can be studied in contrast with that of the present day as nowhere else in America.

Environed by protecting hills and thus exempt from heavy winds, surrounded by enchanting natural scenery, beautified by orchards and gardens of flowers, blessed with a climate that is free from extremes of heat and cold, and air that is pure and tonic; supplied with an abundance of pure water for domestic and irrigating purposes from the extensive storage reservoir in the mouth of Santa Fe Canyon; furnished with competing rail, express, and telegraph communication with all outside points; the headquarters of all the Federal and Territorial officials; the meeting place of the legislature, the supreme court, the United States Court of Private Land Claims, the United States and Territorial district courts, and the various Territorial boards; the home of the archbishop of New Mexico, Arizona, and Colorado; putting in a modern sewerage system, and preparing to build large new schoolhouses up to he highest standard of excellence, Santa Fe is naturally forging to the front as a popular residence city.

The waterworks are located about 2 miles up the Rio Santa Fe, cost about $300,000, and consist of a large reservoir or artificial lake secured by means of a semicircular dam across the canyon—600 feet

long, 350 feet thick where securely tied to berrock, and 120 feet high—with mains and service pipes extending to every part of the city. A smaller reservoir on the hillside supplies the power required to operate the city's electric-light plant. The present population is about 8,000.

Cerrillos is the principal trading point in the southern, and Espanola in the northern section of the county. As has been shown in previous parts of this review, both have splendid resources, both are flourishing and progressing, like all parts of the county; both are yearly building large business houses and better private residences; both have good schools and several churches, and both are clearly destined to grow in business and population.

Among the substantial improvements at Cerrillos may be mentioned a handsome stone schoolhouse, while an idea of the trade of Espanola may be gained from the fact that one general store there annually sells goods to the amount of about $150,000.

Possessing material resources unrivalled in value and variety, and surrounded by exceptionally favorable natural conditions, the people of Santa Fe County are enjoying a prosperous present and contemplating the future with unbounded confidence.

WOMAN'S BOARD OF TRADE.

The woman's board of trade of Santa Fe has very recently passed its seventh anniversary. The founder of this organization is Mrs. Cora L. Bartlett, wife of the present solicitor-general of the Territory of New Mexico.

The object of the organization is to advance every interest pertaining to the welfare and prosperity of the "oldest city in the United States." This body is regularly incorporated under the laws of the Territory of New Mexico. The standing committees for work are, finance, library, visiting and relief, intelligence, improvement, industrial house, woman's exchange, prevention of cruelty to animals, reception and education, press, and cemetery.

The public plaza is entirely under the direction of the Woman's Board of Trade of this city, and the city of Santa Fe appropriates $200 per year towards its support. A free public library of over 1,200 volumes and a free reading room, with all the leading magazines and papers, are open to the public.

A half, or pauper rate, is granted this board by both the Atchison, Topeka and Santa Fe Railroad and the Denver and Rio Grande Railroad companies, and with the fiscal year ending June 30 there have been 36 half-rate tickets granted. It also owns a pauper burial ground for the benefit of those too poor to purchase lots.

The visiting and relief work is the most important of all its branches, as hundreds are given relief in one way or another every year.

The cemetery committee which has had charge of Fairview since May 1 has expended $166 cash, besides donations of labor, lumber, water, etc.

The board owns 25 shares of stock in the fruit evaporating company, its object being to assist in establishing and promoting any worthy enterprise.

The treasurer's report up to June 30, 1899, shows a balance on hand at that date of $220.76. Total receipts from all sources, $1,038.61. The expenditures from this amount for salary of librarian, relief work, policeman for plaza, purchase of books, etc., amount to $817.85.

The woman's board of trade prides itself on the businesslike way in which its affairs are conducted, as well as its meetings. Its

SAN MIGUEL CHURCH, SANTA FE.

membership remains about the same (31 members) and unlimited. Every progressive woman in Santa Fe should be a member of this board, granted, of course, that she be willing and is so situated that most of her time can be given to work for the public.

The officers for the year 1899 are as follows: President, Mrs. Iad Rivenburg; vice-presidents, Mrs. George H. Wallace, Mrs. Creighton, and Mrs. Warner; recording secretary, Mrs. Anita Chapman; corresponding secretary, Miss Mamie Morrison; federation, Evaline Crichton; treasurer, Miss Bertha Staab; chairman of State correspondence for G. F. W. C., Mrs. M. J. Warner.

EARLY HISTORY.

In 1541, when Coronado passed through the then unexplored country in search of the fabled Seven Cities of Cibola, he found an Indian pueblo or town already established upon the spot where the city of Santa Fe now stands. It was undoubtedly a place of much importance among the tribes who occupied the country at that time, as Coronado estimated the population at 15,000 souls. The many natural advantages of the location early attracted the attention of the Spanish settlers, and about the year 1600, perhaps sooner, it became a permanent Spanish town and the seat of government for that part of New Spain which was ceded to the United States in 1848.

On August 8, 1680, the Pueblo Indians, under the leadership of Pope, a Taos Indian, revolted against the Spanish and began a war of extermination on the invaders. So successful were they in the uprising that on August 21 of the same year the Spaniards were compelled to evacuate the town and retreat to a point near what is now the city of El Paso, Tex. So soon as the Spanish were gone Santa Fe was partially destroyed by fire. The churches and monastery were burned save the adobe walls, the official documents furnished fuel for a huge bonfire in the plaza, and as far as possible all evidences of the Christian religion were wiped out.

Santa Fe, and in fact the whole land, remained in possession of the Indians until September 13, 1692, when Don Diego de Vargas Zapata Lujan, at the head of 80 mounted Spaniards and 100 friendly Indians, after a battle of eleven hours, defeated the Pueblos and regained possession. After that memorable fight the Spanish maintained their supremacy in New Mexico until August 18, 1846, when Colonel Kearny, at the head of a detachment of United States troops, entered Santa Fe and took possession of it in the name of the United States. It is impossible to here go into details of the history of the city before or after the American occupation, interesting as it is, but in the light of that history no other city in the entire country is so rich in tradition and in historic events as this ancient city of the Spaniards.

PLACES OF INTEREST.

To enumerate all the places of interest in Santa Fe would require entirely too much space for the purposes of this brief sketch, but a few of the most important are:

The Territorial library, containing the ancient Spanish and Mexican archives from 1621 to 1846.

San Miguel Church, built in 1540, partially destroyed in the revolution in 1680, reoccupied in 1692, and completely restored in 1710. This is the oldest church in the United States and contains many relics of the early days.

The old house, believed to antedate the Spanish occupation.

The Cathedral of San Francisco, behind which is the chancel of the old parish church, with a carved and painted reredos, both curious and interesting, erected by Governor Del Valle and his wife in 1761.

The cathedral museum, containing many Spanish paintings and other objects of interest.

The Territorial historical rooms, full of antiquities of historic interest.

Old Fort Marcy, the commanding situation famous in all the sieges of the city; ruins of the old fort built by Colonel Kearny in 1846.

The garita, on the road to old Fort Marcy, by the west wall of which the leaders of the revolution of 1837 were executed.

The plaza in the center of the town, around which cluster many memories of the conquest of the land by the hardy Spaniards and of the stirring scenes of more recent days. The soldiers' monument is located in the center of this park.

The Church of Our Lady of Guadalupe, with its large and interesting altar piece on canvas, containing six pictures of the appearance of the Virgin to Juan Diego, and other paintings and wood carvings.

Monument to Kit Carson in front of the Federal building.

The Rosario Chapel, erected on the spot where De Vargas made his vow before the surrender of the city in 1692.

The most interesting of all the buildings is, without doubt, the governor's palace, an adobe structure built in 1598 and continuously occupied by the Spanish, Mexican, and American governors for three hundred years. The men who have lived and conducted the affairs of state in the old pile included some of the foremost names of the land, not only of the Territory but of the Eastern States.

To quote from the words of Ex-Governor Prince, author of the most authentic and complete history of New Mexico extant:

Without disparaging the importance of any of the cherished historical localities of the East, it may be truthfully said that this ancient palace surpasses in historic interest and value any other place or object in the United States. It antedates the settlement of Jamestown by nine years and that of Plymouth by twenty-two, and has stood during the two hundred and ninety-nine years since its erection, not as a cold rock or monument, with no claim upon the interest of humanity except the bare fact of its continued existence, but as the living center of everything of historic importance in the Southwest. Through all that long period, whether under Spanish, Pueblo, Mexican, or American control, it has been the seat of power and authority. Whether the ruler was called viceroy, captain-general, political chief, department commander, or governor, and whether he presided over a kingdom, a province, a department, or a Territory, this has been his official residence.

From here Onate started, in 1599, on his adventurous expedition to the eastern plains; here, seven years later, 800 Indians came from far-off Quivirato to ask aid in their war with the Axtaos; from here, in 1618, Vicente de Salivar set forth to the Moqui country, only to be turned back by rumors of the giants to be encountered; and from here Peñalosa and his brilliant troop started on the 6th of March, 1662, on their marvelous expedition to the Missouri; in one of the strong rooms the commissary-general of the inquisition was imprisoned a few years later by the same Peñalosa; within its walls, fortified as if for a siege, the bravest of the Spaniards were massed in the revolution of 1680; here, on the 19th day of August of that year, was given the order to execute 47 Pueblo prisoners in the plaza which faces the building; here, but a day later, was the sad war council held which determined on the evacuation of the city; here was the scene of the triumph of the Pueblo chieftains as they ordered the destruction of the Spanish archives and the church ornaments in one grand conflagration; here De Vargas, on September 14, 1692, after the eleven hours' combat of the preceding day, gave thanks to the Virgin Mary, to whose aid he attributed his triumphant capture of the city; here, more than a century later, on March 3, 1807, Lieutenant Pike was brought before Governor Alencaster as an invader of Spanish soil; here, in 1822,

BUSINESS BLOCK IN SANTA FE.

GOLD MINE, SIERRA COUNTY.

the Mexican standard, with its eagle and cactus, was raised in token that New Mexico was no longer a dependency of Spain; from here, on the 6th day of August, 1837, Governor Perez started to subdue the insurrection in the north, only to return two days later and to meet his death on the 9th near Agua Fria; here, on the succeeding day, Jose Gonzales, a Pueblo Indian of Taos, was installed as governor of New Mexico, soon after to be executed by order of Armijo; here, in the principal reception room, on August 12, 1846, Captain Cooke, the American envoy, was received by Governor Armijo and sent back with a message of defiance; and here, five days later, General Kearny took formal possession of the city, and slept, after his long, weary march, on the carpeted earthen floor of the palace.

Coming down to more modern times, it may be added that here Gen. Lew Wallace wrote Ben-Hur, while governor of the Territory, in 1879 and 1880.

SIERRA COUNTY.

There has been a remarkable and gratifying development of the two principal industries of this county during the past two years, and latest reports prove that in both stock-raising and mining interests this progress is in full tide.

Though small in area, Sierra County contains a large proportion of rich pasture lands, and the cattle interests are perhaps the most uniformly prosperous. At present there are upon the various ranges 130,000 head of cattle, 100,000 sheep and goats, and some 16,000 horses. About one-tenth of the cattle is owned by the Las Animas Cattle Company, the remainder being well divided between a great many smaller ones. The profits of the industry remain with and redound to the benefit of the community.

In agriculture there has been little progress. About 6,500 acres are under cultivation out of some 300,000 acres of good, arable land that could be brought under ditch without too great expenditure. The farmers are prosperous and find a ready market for their entire product in the mining camps and at the cattle ranches. The prices they get would excite the envy of a Kansas farmer: Hay, $12 to $16 per ton; grain, 1 to 1½ cents per pound; potatoes, 2 to 2½ cents per pound; apples, 2 to 5 cents per pound. The product of the farms does not near supply the needs of the towns and ranches, and the merchants get their largest supply from Kansas, Colorado, and California.

POPULATION.

The population of the county is between 5,000 and 5,500, and is composed of two-thirds American miners and settlers and the remainder of the native Spanish-American people. There are no Indian residents within 150 miles, and those only a miserable remnant, kept strictly upon an Arizona reservation. The native Mexicans are a peaceable, frugal, and industrious race, and they afford an increasing source of cheap labor in mine and field.

PUBLIC SCHOOLS.

Excellent schools are maintained in seventeen school districts, under the supervision of the county school superintendent. Eight to ten months of the year are devoted to the education of children, and the teachers selected are of the very best character. The school fund has always been cherished, and commodious, substantial, and handsome schoolhouses have been built and are building. In all departments of primary education the school system of Sierra County will bear comparison with communities otherwise far more advanced.

CLIMATE.

It is not too much to say of this land of sunshine that there exists a perpetual summer. There is but just enough of cold in the months of November and December to mark the change from summer to winter, while a fall of snow is rare, and at most does not remain upon the ground more than a few days. In the higher portions of the mountain ranges some snow is, doubtless, preserved during the colder months, and serves to maintain the summer streams. With such a winter temperature it might be expected that a very high thermometer would rule in summer, but such is not the case. From 90° to 95° in the shade is the greatest heat recorded, and from 20 to 30 below freezing point the most severe cold. The altitude—4,000 to 5,000 feet—of the main portions of the region will account for these moderate extremes. In such a climate mining operations are pursued to the greatest possible advantage, and agriculture aided by irrigation has no drawbacks. The devastations of snowslides and blizzards are here unknown, and the same may be said of pneumonia, that scourge of the miners in the North.

THE SANTA FE RAILROAD.

The Atchison, Topeka and Santa Fe Railroad passes through Sierra County, like the river, from north to south. Its distributing points are at Lake Valley for the south and at Engel for the east, from whence well-equipped stage and freight lines penetrate to the different towns and villages of the county. The Santa Fe directory has done much to develop the resources and aid in the growth of this section by granting low rates of transportation on ores to the great smelting points of Colorado, and of Kansas City, Socorro, N. Mex., and El Paso, Tex. For the 740 miles from Lake Valley to Pueblo and Denver the rate is but $5.80 per ton. Some important branches and extensions are contemplated to penetrate to the most remote mining camps of this region, and it is the aim of the directory to foster and sustain, to the extent of its power, the rapid growth of the mining industry. An immediate improvement is the extension of the Lake Valley branch to Hillsboro, the county seat, which will bring the road within 12 miles of the most distant mines in the southern half of the county.

WAGON ROADS.

The roads are of good grade, well-maintained repair, and conduct through the most important districts and reach the more notable mines. Roads from the agricultural lands enable the farmers to sell their produce in the markets of the mining towns, where they obtain prices really remunerative.

LABOR AND WAGES.

Miners earn $3 and $3.50 per day; laborers $1.50 to $2.50. Most of the labor is performed by the Mexican people, and of these there has been, with the growth of the mining industry, and from the neighboring lands of Texas and Mexico, a steady and sufficient immigration. Skilled miners from the North are constantly arriving, and so far no difficulty on the score of help has been experienced.

THE TRIPPE MINE, SIERRA COUNTY.

UNIV. OF MICH.

SOME OF THE BUILDINGS ON SENATOR ANDREWS'S PROPERTY.

LUMBER, TIMBER, AND FUEL.

Sawmills located in the canyon valleys of the Black Range supply the needed lumber for buildings and use in mines, and an ample supply is kept on hand in the lumber yards of the different towns at an average price of 3 cents per foot. Heavy mining timbers for supports are delivered at the mines for from 4 to 8 cents per running foot, according to locality and proximity to timber. Fuel wood is delivered in the towns at $4 per cord. The use of coal is increasing, and with the extension of the railroad to Hillsboro will become the universal fuel for all manufacturing purposes.

MERCANTILE SUPPLIES.

In the principal towns of Hillsboro and Kingston very large stocks of merchandise are carried, and prices will compare favorably with any other known mining districts. Smaller but complete stocks are also carried in the lesser towns of Chloride and Lake Valley, and some convenient stores are to be found where towns have not yet sprung up, but where there is mining, and supplies are needed. The Sierra County Bank at Hillsboro and the Percha Bank at Kingston supply the needed facilities of financial exchange and accommodation.

MILLS AND SMELTERS.

The building of ore-reduction works has kept pace with the production of the mines. Amalgamation and concentration works both are now crowded to their utmost capacity, and an enlargement in this direction must soon be made. Two smelters, or rather matte furnaces, have been erected and operated during the past year, and in this field a large expansion is probable and expected. Water supply for mills has been obtained during the dryest seasons known in the history of New Mexico, and by the aid of some engineering the available supply can be greatly increased.

HILLSBORO.

Hillsboro at the center of the gold district is still the leading town of the county of Sierra. The mines maintain a regular output, and several new ones have been brought into prominence during the past year. Principal among those may be mentioned the Trippe mine owned by a Pennsylvania company. Three shafts have been sunk on this mine, and levels opened to a depth of 300 feet. A mill has been built and is in constant operation, handling 20 tons of ore per day, and turning out bullion and concentrates to the value of $10,000 per month. The mine is also shipping to the smelters a nearly equal value of first-class ore, from $60 to $100 in value per ton. Near the mill and around the post-office store a little town is springing up called Andrews, after Senator Andrews, the president of the company. Of the older mines the Richmond, the Wicks, and the Snake group maintain this position and keep in employment from 100 to 150 men. Other mines are being worked under lease or by their owners, but in the aggregate contributing considerably to the total output of the camp. The building of ore-reduction works and the introduction of improved machinery have kept pace with the production of the mines. Amalgamation and concentration works are now crowded to their utmost capacity, and an enlargement in this direction must soon be

made. About $500,000 is the estimated output of this camp for 1899. The Hillsboro ores carry from 3 to 20 per cent of copper, and the great rise of this metal is almost as much to the miners as the rise in beef values has been to the cattlemen. From 60 cents per unit in 1895 to the present $2.85 is a big jump, but it is founded on true scarcity and demand, and therefore likely to be well maintained.

Among the silver camps now recovering from the long depression and again getting to work at mining for what there is in it, Hermoso has been making some great records of happy results and strikes by leasers and small owners. A pocket of ore in that district means thousands of dollars to the finder. The most remarkable thing in silver this year, however, has been at the Lookout mine on Trujillo Creek, the last carload of ore netting the lessees and owners $11,000. With three chutes of this ore opened and actively working, this mine is likely to make a big sensation before long.

Other mines in this county are also producing very rich ore, and there is a general feeling of renewed confidence in silver mining. At the old and once famous camp of Kingston there is also a noticeable revival of mining and increase of production. A new reduction mill built there by a Detroit company is successfully handling large quantities of low-grade ore, and the product is a great addition to the resources of the camp.

Lake Valley is also waking up and doing some mining for rich ore, and for the valuable fluxing ores peculiar to that camp. In the Caballo Mountains copper has been found in paying quantities and under circumstances that indicate permanence. Several good miners are in the district, and much may be expected from this source. Altogether the people of Sierra County are well and profitably occupied, and are as self-supporting and independent a community as can be found anywhere.

Colonies of from ten to twenty families with small capital, say from $1,000 to $2,000 each, could make excellent locations in this county. The land is cheap and the titles are good, and there is a great demand at all times for agricultural products.

Sierra County enjoys the distinction of being out of debt. Its warrants are maintained at par, its resources varied, its people energetic and hopeful, and its outlook for the future bright. It is situated in the south central part of the Territory. Its area is about 2,376 square miles. The county lies principally in the Rio Grande watershed, which river traverses its entire length, taking up in its course hundreds of lesser bodies of water, which will serve as an important factor in making agriculture and horticulture the leading industries of this section.

WARM SPRINGS.

The warm springs, in the valley between Hillsboro and the mines, are provided with a commodious bath house, swimming and private baths, and are a great source of health and pleasure to the miners, who attend in great numbers at least once a week. The water is just comfortably warm, and the baths are in constant use the year round.

At Las Palomas, on the Rio Grande, and at Ojo Caliente, north of Grafton, are extensive hot springs and noted health resorts.

HON. W. H. ANDREWS'S PROPERTY.

The most extensive mining property in the Hillsboro district is that operated by Hon. W. H. Andrews, of Pittsburg, Pa., under the name

THE CORRAL AND ONE OF THE LARGE ORE WAGONS; ALSO SHOWING SENATOR ANDREWS ON HORSEBACK.

A Bird's-eye View of Mill and Buildings, Senator Andrews's Mine.

of the Philadelphia Mining and Milling Company. Senator Andrews entered the field of mining in New Mexico in 1897. He purchased and bonded a large number of claims in the Hillsboro district, and after thoroughly prospecting each one selected those best adapted to his purpose and relinquished the balance. Those retained were the El Oro, Golden Rule, Golden Courier, Bona, Little Stanley, Mignon, Corona, Satisfaction, Trippe, Hillsboro, and Homestake.

After the selection had been made preparations were immediately begun for the construction of a mill. To determine what process was best adapted, several tons of ore were shipped to Denver, Colo., and a thorough test of the various processes for the extraction of gold was made, and the Peletin-Clerici cyanide process was accepted. A plant capable of handling 50 tons per day was constructed on the El Oro claim. The process was eminently satisfactory at first, but the character of the ore changed, and it was found necessary on this account to discard the cyanide process entirely and replace it by ordinary amalgamation and concentration, the Wifely concentrating table being used for the latter operation. The difficulty with the cyanide process lay in the fact that the ore handled was very heavy in iron. After it was crushed to 60 mesh and delivered to the cyanide tanks it was there agitated for a period of about nine hours, the coarse gold settling of its own weight, the fine gold being dissolved and precipitated on quicksilver (which covered a copper plate) by electricity. The agitation acted as a concentrator, and the iron settled over the quicksilver to a depth of several inches, thus preventing a greater extraction than from 45 to 52 per cent, while by amalgamation and concentration an extraction of from 80 to 92 per cent is secured.

Operations have been confined mostly to the Trippe mine. The work on this claim consists of three shafts, which have been sunk to a depth of 300, 120, and 50 feet, respectively. From the 300-foot shaft levels have been run at 50, 150, and 250 feet. From the 120-foot shaft a level has been run to connect with the 150-foot level from the 300-foot shaft, thus insuring an abundant supply of air. In all these openings ore is to be found. What is known as the low-grade ore—that running below $40—is run through the mill and concentrated, the concentrates being shipped to the smelter. Of this character of ore there is a large body, varying in width from 1 to 3 feet. The high-grade ore—that running over $40—is stacked and shipped direct to the smelter. This ore, varying in width from 6 to 18 inches, is found on all the levels. The richest body of ore is found in the 250-foot level. In width it varies from 14 to 18 inches, and is found for a distance of 100 feet (at which time this report is made), and assays $1,630 per ton. Every indication points to the continuation of this body of ore, and should it continue it will make the Trippe the largest gold producer in New Mexico. The ore is hoisted from this mine by a Fairbanks & Morse gasoline hoist on the 300-foot shaft and whims on the other two. These whims will be replaced by gasoline hoists in the near future.

Situated on the El Oro are the company's buildings, which consist of a hotel, store, corral capable of stabling 30 head of horses, the senator's private residence, and the bunk house. The latter has just been completed, and is unique in its arrangements. Every employee is supplied with an iron bedstead, mattress, and pillow. There are reading and toilet rooms, the former supplied with the latest periodicals and newspapers, and the latter with towels, soap, etc. Each occupant is assessed 10 cents per week, which defrays the expenses of

the janitor and subscriptions to the magazines and newspapers. All the buildings are substantial and comfortable.

The improvements under way and contemplated are a schoolhouse, which may be used on Sundays for religious services, an electric plant, capable of furnishing power for 400 16-candlepower incandescent lights and 10 arc lights, and the enlargement of the corral.

John I. Thomson is general manager for the company and Peter Townsend the mine foreman.

SOCORRO COUNTY.

Socorro County is situated in the central portion of New Mexico, between the thirty-third and thirty-fifth parallels; is bounded on the north by Valencia County; on the south by the counties of Grant, Sierra, Otero, and Donna Ana; on the east by the counties of Lincoln and Otero, and on the west by the Territory of Arizona.

This is at present the largest county in New Mexico, containing approximately 10,000,000 acres of land, consisting of agricultural, grazing, mineral, coal, timber, and saline lands.

Under the present facilities for irrigation about 1,000,000 acres are available for agricultural purposes. Vast areas of excellent land for agricultural purposes are found on the east of the Rio Grande, extending from the eastern slope of the Serros del Pueblito, San Pedro, and Fra Cristoval mountains to the western slope of the Oscura, Burro, and San Andres mountains, covering an area of from 15 to 25 miles in width and 40 to 50 miles in length, the greater part of which might be reclaimed by means of a system of reservoirs for the storage of water. Equally large areas of as fine land as the sun ever shone on is found west of the Magdalena Mountains, in the valley situated between the Datil Mountains on the north and the San Mateo Mountains on the south, a large portion of which might also be reclaimed by means of storage reservoirs.

Estimated population, 19,000, of which approximately two-thirds are native born.

The following are a few of the principal points of importance in the county, to wit: Socorro, San Marcial, Magdalena, San Antonio, Kelly, Mogollon, Cooney, Graham, Alma, Frisco, Gila, Mangus, Luna, Sabinal, Lemitar, San Acacia, Polvadera, La Joya, and Paraje, of which Socorro, commonly known as the "Gem City," is the county seat and headquarters for the fifth judicial district, comprising the counties of Socorro, Lincoln, Chaves, and Eddy. Socorro has a population of 3,000 inhabitants, and is beautifully situated on a slight elevation or tablelands immediately adjacent to the Rio Grande Valley about 2 miles west of the river, at the base of the Socorro Mountains. The city owns and controls its own waterworks, the supply of which is acquired from the Socorro Mountain springs, about a mile above the city, and at an elevation sufficient to furnish any pressure that may be required for any and all purposes. Analysis of the water demonstrates the fact that the same is chemically pure. Principal resources are farming, fruit raising, mining, manufacture of brick, cattle and sheep raising. Climate excellent; is the headquarters for the furnishing of supplies to a large area of country tributary thereto. (The Socorro brickworks have the reputation of producing the best quality of building and fire brick in the West.) Socorro has two banks, three flourishing flouring mills, two weekly newspapers.

THE MILL ON SENATOR ANDREWS'S PROPERTY.

THE INTERIOR OF BUNK HOUSE, SENATOR ANDREWS'S MINE.

SAN MARCIAL.

San Marcial is also situated in the Rio Grande Valley, about 28 miles south of Socorro, and is a stirring, enterprising, up-to-date town of 1,500 inhabitants; division point of the Atchison, Topeka and Santa Fe Railway Company, and where the railway company repair shops and roundhouses are located; also a hotel; is headquarters for the furnishing of supplies to an extensive area of country tributary thereto, including the neighboring towns of Val Verde, Contadero, Old San Marcial, Cantarecio, Paraje, and Rosedale mining district. A modern flouring mill, owned by J. N. Broyles, is in operation day and night; one weekly newspaper, one bank. Principal resources are cattle, sheep, mining, fruit raising, and farming.

MAGDALENA.

Situated about 27 miles from Socorro is Magdalena, which is the terminal of the Magdalena Branch, operated by the Atchison, Topeka and Santa Fe Railway Company, and is one of the principal points in the county for the shipment of cattle and sheep, shipments of cattle for the year ending August 25, 1899, amounting to 24,387 head. Has a population of about 700 inhabitants. Principal resources are mining, smelting of ores, cattle, and sheep. Is headquarters for the furnishing of supplies to towns and ranches tributary thereto for a distance of 300 miles, including Springerville, Ariz. A 100-ton smelter, owned and managed by Capt. A. B. Fitch, is in operation day and night, and from the product of which has been shipped during the year ending August 25, 1899, 1,225,152 pounds of bullion. Amount of ore shipped during the same period, 1,020,000 pounds. At the present time new and important discoveries have been made in the Magdalena mining district, which will very materially increase the product from this place.

SAN ANTONIO.

San Antonio is situated 10 miles south of Socorro, in the Rio Grande Valley, along the main line of the Atchison, Topeka and Santa Fe Railway; has a population of 1,000 inhabitants within a radius of 2 miles; has three large general merchandise stores. Occupation and principal resources are farming, fruit raising, freighting, coal mining, cattle and sheep.

Eight miles east of San Antonio are situated the Carthage coal fields, owned and operated by Hilton & Co., of San Antonio. The coal vein is 5 feet thick, and of a superior quality for steam and coking purposes. It is hauled by means of wagon transportation to the railroad at San Antonio for shipment. This place is also the headquarters for furnishing and forwarding supplies to towns and ranches east of the Rio Grande, including the town of Whiteoaks. The valley lands are very fertile and considered as good as any in the valley, a portion of which from experiments have been found to be especially adapted to the culture of canaigre root and sugar beet. The Bosque del Apache grant is situated 3 miles south of San Antonio, and contains something over 12,000 acres of choice valley land, which at present is not under cultivation, but would furnish an excellent opportunity for capital desiring to engage in the culture of sugar beet and the refining of sugar. Similar opportunities

can be found at various places along the Rio Grande Valley; in fact, choice lands suitable for the culture of sugar beet can be found adjacent to any of the above-named towns in the valley. Water supply for irrigation purposes is derived from the Rio Grande through the medium of community irrigation ditches.

MOGOLLON.

This is one of the oldest mining camps in the county, having been discovered in 1879. Has several producing and dividend-paying mines. Population about 750.

FRISCO.

Frisco is situated in the western portion of the county, on the Frisco River. Principle resources are farming and stock raising. Population about 500.

MINES AND MINING DISTRICTS.

The following are a few of the principal mines and mining districts in the county: Cooney district, a portion of the Black Range district, Dry Creek district, Sullivan's Hole district, Cat Mountain district, White Water district, Iron Mountain district, Magdalena district, Socorro mining district, Lemitar district, Kelly mining district, Rosedale mining district, Water Canyon mining district, Ladrones mining district, La Joya mining district, Oscura mining district, Hansonburg mining district, Burro mining district, San Andres mining district.

In the Cooney district are located and in operation several mines, stamp mills, etc., the Cooney mine or Silver Bar having a production of several hundred thousand dollars. Character of ore: Gold, silver, and copper, a portion of which is saved on the plates and the balance by concentration. The Queen, owned by a Galveston company, has considerable development and also a modern 10-stamp mill, amalgamation process.

The Florida group, owned by W. J. Weatherby, has several hundred feet of development; a gold free-milling proposition; pay-ore streak ranging from 18 inches to 3 feet in width; values, $20 and upward. A splendid opportunity for the investment of capital.

The Little Fannie mine, situated about one-half mile from the town of Mogollon, has produced thousands of dollars; is considered one of the best paying mines in the district; has attained a depth of something over 300 feet. Character of ore, milling. Values saved by amalgamation. Pay ore from 5 to 20 feet thick; values, $15 to $40, saving about 75 per cent.

Maud S, situated in the town of Mogollon, has produced $675,000; has a 10-stamp mill. Attained a depth of 375 feet below creek level. Pay-ore streak, 18 inches to 3 feet. Values saved by amalgamation and milling process.

Eberle mine, situated in Mogollon, is one of the best propositions in the camp, has several hundred feet of development, and is reported to have sufficient ore in sight to run a 50-stamp mill for a term of five years. The property has been in litigation for several years, during which time the owner has been constantly developing with a view to erect necessary machinery thereon for the reduction of ores, which will probably be executed in the near future.

Last Chance mine, situated in the Last Chance gulch, one-half mile from the town of Mogollon, has produced $160,000, has a 15-stamp

mill, and was recently sold to English capitalists. Is working day and night and reported to bid fairly well toward becoming one of the heaviest producers in the camp. The vein is immense, varying in width from 10 to 30 feet; average value about $10, some of the ore running up into the hundreds.

Deep Down mine, situated on opposite side of the canyon to the Maud S, on the same lead, has a 5-stamp mill, has produced $65,000, and has a bright future.

The Confidence mine, one of the largest and most fully developed properties of the camp, has an estimated output of something over $1,000,000; has a 30-stamp mill run by water power; has attained a depth of over 700 feet. The mill is situated on White Water.

Black Range district. About one-half of this district is situated in Socorro County, the balance in Sierra County. The ores of the Black Range district are high grade, as has been fully demonstrated in the past by shipments heretofore made. A ton sample shipped from the Iffie group gave returns of $211, of which $180 was in gold. An average of 10 samples from the same property, taken by a conservative mining expert, gave returns showing average values of 6⅔ ounces gold and 90 ounces silver.

The Great Republic group is also situated in this district, and upon careful examination demonstrates the fact that it is capable of becoming one of the heavy producers of this region.

The Ivanhoe has also produced some very rich ore.

The Silver Monument, at the head of Chloride Creek, has a production record of something over $100,000. South of Chloride Creek is the United States Treasury mine, showing an ore body of 20 feet at the 100-foot level, averaging $10 per ton in gold.

South of Hagan's Peak are the Colossal and Midnight, the former having produced $70,000. Another one of the heavy producers is the Readjuster, a copper and gold proposition, owned and controlled by Gen. Quinby Vance. Immense deposits of iron ore, from 50 to 500 feet in width and running from 58 to 65 per cent iron, are found in different portions of the district, and many other properties equally meritorious. This district will some day in the near future be the Cripple Creek of New Mexico, the possibilities of which are far greater than the expectations of even the most sanguine friends of the district.

Dry Creek district is situated in western Socorro County, about 15 miles from the town of Mogollon. Rich copper and lead ores have been found in the district, one of the promising prospects being owned by Dan Bechtol; also "tellurium ores," running up into the thousands. The district is in need of development. There is an abundance of running water. There are also some very promising gold prospects owned and controlled by Mr. Bachellor and associates, of Graham, N. Mex. With development the district has a promising future in store.

Sullivan's Hole district is situated in the San Mateo range, and some very promising gold claims have been located and some mining done. The district, however, is in need of development and would furnish a good field for prospectors and capital. Nearest railroad station is Magdalena.

Cat Mountain district is situated about 10 miles from Magdalena, and is systematically one of the largest free-milling gold propositions in New Mexico. The property is equipped with a steam-hoisting plant, and shows 25,000 tons of ore in sight that will mill $10 per ton above the 100-foot level. Below the 100-foot level the ore body is increasing

in size and value as depth is attained. There are other promising prospects that might do equally as well with development.

Rosedale mining district is situated about 40 miles west of San Marcial in the San Mateo Mountains. The character of the ore is gold. One of the principal producers is the property operated by the Martin Company, which has paid handsome dividends to the stockholders for some time and is daily becoming more valuable with development. Another promising property is a gold proposition owned and operated by the Hanna Bros. & Bell, of San Marcial. Values in this district seem to increase with depth. The ore is mostly free milling, the tailings being saved by concentration, or might be treated with cyanide.

Iron Mountain district is situated 6 to 10 miles north of Cat Mountain. Nearest railroad station is Magdalena. This district is undeveloped. Has several promising prospects, showing values in gold, silver, and lead.

Magdalena district is situated adjacent to Magdalena. Gold, silver, and lead properties have been successfully worked for several years. Lead carbonates are found in many of the mines in paying quantities. North end of the district is principally gold.

Kelly mining district is situated immediately south of and adjoining the Magdalena district. In the district is situated the town of Kelly, a prosperous mining town. Nearest railroad station is Magdalena, only 3 miles distant. The Kelly district is one of the oldest in the county, and has probably produced more values than any other district in the county. The ores are principally lead carbonates and galena; there are also one or two promising copper properties. One of the principal copper propositions is operated and owned by Walter Cook. The "Graphic" mine is situated in this district, and has been producing ore and paying dividends for the past fifteen years. The property is now being operated under the efficient management of Capt. A. B. Fitch, and is reliably reported as doing better than at any time in its history. Captain Fitch is also operating, in connection with the mine, a hundred smelter. Perhaps the most forcible testimony as to the worth of this property is the fact that during the cloudy days of 1894 and 1895, when lead sold as low as $2.40, the smelter and mine hardly ever lost a shift. The lead carbonates carry some gold and silver, averaging from $2 to $10 per ton.

The "Kelly" mine is situated south of the "Graphic" and has produced thousands of dollars. The mine is at present operated under a lease and ore is being steadily shipped.

"The Juanita" is another good lead property, but is not being worked at the present time on account of being in litigation, is a splendid property, and will be one of the heavy producers as soon as the litigation is settled.

East of Kelly is found the "Hard Scrabble," which has a good production record. South of Kelly are found the "Mary" group, also the "Imperial;" next the "Young America," the last named having shipped considerable ore, the values being found in carbonates running from 30 to 60 per cent lead, and also some silver and gold.

Adjoining the "Graphic" is found a promising lead prospect owned by C. C. Clark, of Kelly. In the immediate vicinity is also found the "Ambrosia," "Yellow Rose of Texas," operated or owned by A. D. Coon, of Socorro, and numerous other prospects which would no doubt be equally meritorious with necessary development.

The Water Canyon mining district is still in its infancy, although prospecting has been carried on for some time. Ores: Gold, silver, lead,

and copper. One of the principal properties is the Timber Peak, situated near Six Mile. The same is being operated under the direction of Richard Sanders, of Philadelphia. This is an enormous vein, in fact, a mountain, of low-grade gold ore. Values saved by concentration. The company have recently erected a large mill at an approximate cost of $50,000 for the purpose of reducing the ores. Values are found in iron sulphides. In Water Canyon, about 4 miles from the Timber Peak, is found the "Buckeye," operated by the Buckeye Gold and Copper Company, nearly all of the stockholders of which are residents of the Territory. The values are principally gold and copper. The ores are sulphides and oxides of copper. In this property water level was encountered 125 feet below the surface. The values of the ore are very materially increasing with depth, the character also changing at water level from a decomposed, honey-combed quartz to a copper sulphide, the ore shute from which shipments are being made so far as uncovered ranging from 2 to 5 feet in thickness. This property has also an immense vein of low-grade ore that would pay to treat on the ground. Formation: Lime and porphyry, hanging-wall lime, foot-wall quartzite. The property is equipped with up-to-date steam hoists, mine pumps, etc., and under the efficient management of the president of the company, Mr. C. T. Brown, and Lee Terry, mine foreman, the property is expected to become in the near future one of the heavy producers of the district.

In Copper Canyon, a few miles distant, is found the Driscoll property. This is a gold proposition and one of the most promising in the district. It has an immense contact vein of low-grade milling ore. Negotiations are in progress with Eastern capitalists for the purchase of the property. This proposition certainly affords an encouraging field for capital seeking investment. There is an abundance of water and an ideal mill site. The property is owned by Dr. Driscoll, of Socorro.

Beyond Dark Canyon in the same district are found a number of paying lead properties, one of the principal mines being owned and operated by Col. W. S. Williams, of Socorro. This mine is known as the "Bell," and at the present time is making regular shipments. The ore is galena, running from 30 to 65 per cent; also carries from $2 to $20 in silver and gold. In the same canyon and district adjacent to the Bell is found another valuable lead property, owned by Mr. Mitchell. The property is being worked under a bond and lease, and has been shipping continually during the past three months; character of ore the same as the Bell. There are numerous other valuable and encouraging prospects that with development will prove to be steady producers. The Water Canyon district is situated 15 miles southwest of Socorro, and is considered by mining men to be one of the best fields for investment in the Territory. As above stated, the district is in its infancy, but all developments so far made have been very satisfactory. The veins seem to be permanent and values universally increase with depth. Abundance of water and timber for mining purposes.

Socorro mining district is situated immediately west and adjacent to Socorro. Character of ore: Gold and silver. This district is also one of the old districts in the county, and has a production record exceeding $1,000,000. The "Torrence," a silver proposition, is not being worked at present, and has large bodies of low-grade silver ore; principal values, silver. Next to the "Torrence" is the "Merritt," owned by a corporation, the principal stockholder of which is A. D.

Coon, of Socorro. This property has an immense body of milling ore (silver) that will average under the present price of silver about $9 per ton. Farther up the mountain is the "Glasson property," a gold proposition, from which some very rich ore has been extracted. This property is considered by mining men to be a very promising proposition. It is owned and worked by Mr. Glasson, of Socorro.

Lemitar district is undeveloped. Ores are copper and lead. Some very good lead carbonate ores have been discovered lately, and considerable work is being done at present. This district is situated about 10 miles north of Socorro.

Ladrones is situated in the Ladrone Mountains, about 25 miles northwest of Socorro. Ore is copper and some silver. The district is undeveloped, but some good copper prospects have been discovered.

Lajoya is comparatively a new district, but active and scientific mining has been going on under the direction of Lon Jenkins, E. A. Levy, and associates during the past year and a half, with very encouraging results. Ores: Gold, lead, and copper. A number of shipments have been made which have paid for developments. The ore is a high grade, and will bear transportation and smelter charges and still leave a profit to the owners. Nearest post-office, Lajoya, N. Mex. The mines are situated on the east side of the Rio Grande, about 5 miles southeast of Lajoya and 2 or 3 miles from the Atchison, Topeka and Santa Fe Railway.

Oscura mining district is situated about 45 miles east of the Rio Grande and the same distance from the railroad. Ores: Copper and lead. Some prospecting has been done and large quantities of low-grade ore have been discovered, but will not stand transportation to the railroad.

Hansonberg district shows copper and some gold and silver. Considerable development has been done in this district, and some very promising copper properties have been partially developed, the principal one of which is owned by A. Hogwall, of San Antonio, N. Mex., and C. Blanchard, of Las Vegas. The ore is very high grade and shipments have been made showing satisfactory returns. Distance from mine to railroad about 35 miles; nearest post-office, San Antonio.

Burro mining district is situated about 50 or 60 miles from the railroad, on the east side of the Rio Grande. Ores principally copper. Some development has been made and very good quality of ore taken out. The greatest drawback is the scarcity of water. It is probable, however, that water might be acquired by boring wells.

San Andres mining district is situated about 30 miles east of Lava Station. Ore: Copper. Considerable work has been done in this district, and at present copper ores are being shipped to El Paso smelter. The veins are good size, and ore running from 13 to 20 per cent is found in paying quantities. Some of the principal properties are owned by Mr. A. T. Harrison, the same being now operated under bond and lease. This is considered one of the richest copper districts in the county.

TIMBER.

The principal timber in the county is situated west of the Rio Grande. Good heavy pine timber is found in various places in the several mountain ranges. The Flagstaff (Ariz.), timber belt extends through western Socorro County. In the Mogollon range perhaps is found the best and largest timber belt in the county, covering an area from 5 to 20 miles in width and 20 to 30 miles in length. We find

another belt of the same timber in the Friscos—Elk Mountains, Black Range, and San Mateo ranges—suitable for commercial and building purposes; also in the Magdalena and Gallina ranges, but not so large or of as good quality as some of the aforesaid ranges. One million acres would probably be a conservative estimate of the area of land covered with heavy pine timber suitable for sawmill and commercial purposes in the county. Very little cutting has been done, except the limited quantities used for mining purposes, erection of reduction works, etc., most of the timber being located a considerable distance from the railroad, and will not stand wagon transportation.

COAL.

Coal is found in the western portion of the county, which is supposed to be the Gallup coal belt. On account of no railroad facilities the coal is not being worked. The veins are from 6 to 7 feet thick. Coal is also found within 15 miles of the Magdalena. The Carthage coal fields are situated east of the Rio Grande, mention of which has been made heretofore.

SALINE LANDS.

Near the western border of the county are situated some salt lakes with an inexhaustible supply of a very good quality of salt, the product of which is being used by the mills at Mogollons, Graham, and Cooney. Some salt is also peddled around and used for domestic purposes. There are also some salt beds near the San Andres mountains, but not as good quality as the first-mentioned salt. Distance from railroad about 175 miles.

VALUATION.

According to tax rolls, which generally show about one-third the actual valuation, the property of the county is valued at $4,700,000; the bonded indebtedness approximately is $175,000.

CATTLE AND SHEEP.

The estimated number of sheep in the county is 200,000; number of cattle, 100,000 head; also several thousand head of horses.

RAILROADS.

The Atchison, Topeka and Santa Fe Railway Company owns and operates 107.76 miles of main-line track and 19.11 miles of side track; also division point and repair shop, round houses, etc., at San Marcial.

The county, generally speaking, is in a prosperous condition, caused by the rise in values of the products of the county, especially in cattle, sheep, wool, lead, and copper, etc.

THE SOCORRO FIRE-CLAY COMPANY.

The Socorro Fire-Clay Company is one of the best known corporations in the Territory and stands in the first rank of New Mexico industries. It has been gradually increased in capacity and improved in the quality of the articles manufactured, until it stands now as the best, if not the largest, fire-clay works in the Southwest. When running full capacity it gives employment to 35 men and ships 150,000 brick per month. It has two late-improved brick kilns with a down draft, having a capacity of 50,000 and 60,000 brick, respectively.

The fire-clay brick for smelter furnaces is made by hand into all shapes and sizes and of two different grades. They are really fine, and are growing in popularity with the different smelters throughout the country. Their building brick is made in three colors, buff, white, and red, and has been used extensively in the building up of Albuquerque and El Paso.

A very careful analysis of the clays surrounding Socorro has been made, and no less than 350 different kinds, suitable for making brick, pottery, tiling, sewer pipes, crucibles, scorifiers, mufflers, and almost everything requiring a fine grade of fire or brick clay.

This growing and important institution, like many others in the Territory, has succeeded only by good management and strict attention to business, and its success is now established beyond all doubt.

TAOS COUNTY.

The agricultural, mineral, and other resources of Taos County are of such a diversified character it will be impossible for me to give more than a brief outline of their nature and importance in the space assigned me.

Taos County might aptly be termed a paradox in civilization. It is the oldest and newest portion of the United States. Here, according to the traditions of our Pueblo Indians, were homes and farms five hundred years ago. Before Columbus discovered this country a portion of the Taos Valley was under cultivation, and before the *Mayflower* anchored off Plymouth Rock houses of adobe were clustered about the mouth of the Pueblo Canyon that sheltered the forefathers of some of the present residents of the Taos Valley. The houses of that period were replaced by the present "Pyramids of Taos," which, unlike those of Egypt, were built for homes for the living and not for the dead. The Pueblo Indians, without doubt, were the first home builders and farmers in America that still exist to emphasize the claim of their fathers to that distinction. Notwithstanding the fact that this is the oldest farming community in the United States, there are thousands of acres in this valley of as fine land as the sun ever shone on, that no doubt has the same growth of sage brush that covered it when the Pilgram Fathers landed on this continent. In many places the primitive methods prevail in the planting and harvesting that were common a thousand years ago, notably the wooden plow, the sickle, and the thrashing floor; yet, with all that, the most beautiful crops are the rule.

The mineral resources furnish a parallel to those of agriculture. The first authentic record of the production of gold, in what is now the territory of the United States, was the production of gold from the placers in the Taos Valley, nearly two hundred years ago, when this country was dominated by the Spanish The records of large shipments of gold to the City of Mexico are in existence to-day, and the ore-placer washings, extending for miles along the Rio Lucero, may be seen to-day. Ruins of Old Arastas that were used, perhaps, centuries ago for the extraction of the precious metals can be found to-day in the mountains; yet, without doubt, Taos County has more square miles of mineral territory that remains untouched by the prospector's pick than any county in the great mineral belt of the West. Surely it is a paradox. Progress in agriculture is noted during the past year. Improved machinery and improved methods are being introduced by the more progressive farmers. The reaper is

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taking the place of the sickle, and handsome carriages by the score are to be seen where the cart and wagon were in use before.

Notwithstanding the excessive drought this season, many fields of wheat will average 40 bushels to the acre, and there is the greatest abundance of agricultural products.

No finer fruit is grown anywhere than here in the Taos Valley. The orchards have come to stay, as failures of a fruit crop are rare indeed, and in some localities entirely unknown.

The greatest difficulty that the farmer in the Taos Valley has to encounter is the market for his surplus. Before the advent of railroads in the western country this valley was the granary of the southwest, and a portion of Old Mexico drew its supplies from here, but in recent years he has been compelled to depend upon a local market that was limited, and this curtailed production. However, the local market is being stimulated by the development of the mines in the adjacent mountain ranges, and another ray of hope from the prospects of a railroad in the near future is stirring the energies of the farmer. A railroad that will furnish a southern outlet, thus reaching the legitimate market for the flour and grain, will make this valley second to none in point of productiveness. The money for this enterprise is already assured, if the details of connection and right of way can be satisfactorily arranged. It is sincerely hoped that before the end of the next year the whistle of the locomotive will be heard in this valley and a new era of prosperity will have begun. With the coming of a railroad, new industries will be developed; this valley will become the feeding ground of northern New Mexico. The thousands of sheep and cattle now shipped to Colorado feeding points will be fattened here. The modern flouring mills will take the place of the old water mills, and reduction works will utilize the great veins of low-grade ores that are now practically valueless on account of the lack of transportation.

MINING INDUSTRY.

Considering the lack of capital, rapid strides are being made in the development of the mineral resources of this county. During the present season one new mill has been placed in operation, one is nearing completion, and the third is contracted for. These will have a combined capacity of over 100 tons of ore daily. In addition to that there are three new shipping mines which have been opened, and more would be listed as producers if capital would furnish local treatment for the ores. Millions of tons of low-grade ores are already exposed by recent development work and scores of low-grade veins remain to be opened. What a magnificent field for genius and capital. Genius to devise and capital to construct the plants for the profitable extraction of the precious metals from nature's treasure vaults in the Taos Mountains. However, capital is no longer ignorant of our great mineral resources, as more Eastern money has been invested in the mines of this county during the past year than in all previous history, but the field is practically unlimited, as this county contains over 900 square miles of known mineral territory. It has the advantage of good roads, timber, and water, and is lacking only in transportation. With the present rate of development Taos County in the near future will be second to none in the production of precious metals. This valley with its 300 square miles of the finest agricultural and fruit land, at an altitude of 7,000 feet, protected on three sides by high mountain ranges, and watered by seven rivers, with a climate that is

unsurpassed, is destined to become the home of 100,000 people. Nature has given it the soil, the sunshine, the scenery, the pure air, and sparkling water; it remains but for man to improve, beautify, and adorn nature's work for this valley to become what the Indian legend claimed for it in the past, "The Paradise of America."

UNION COUNTY.

The most northeastern county of the Territory is Union, which was created in 1893. It is 123 miles long by 55 miles wide from east to west. It is mostly prairie land, but in the northern portion is a branch of the Raton Mountains. The land is chiefly used for grazing purposes, but along the many streams considerable farming is done, the soil being well adapted to the raising of nearly all the small grains and vegetables.

ALTITUDE AND CLIMATE.

The altitude is about 5,000 feet, which is an excellent average for all persons having pulmonary trouble combined with a weak nervous system, since the climate in this county is equal to almost any portion of the Territory for all pulmonary affections. The air is dry and crisp, is neither too hot in summer nor too cold in winter even for the chronic invalid.

TOWNS AND VILLAGES.

Clayton, the county seat, is the largest town in the county, and is situated on the Colorado and Southern Railway (formerly known as the Union Pacific, Denver and Gulf), in the northern half of the county, and about 10 miles west of the Texas line. The population of this town is between 700 and 1,000. It has an excellent water system and electric light plant, modern court-house costing $20,000, and fine public school building costing its progressive taxpayers $10,000, also a modern hotel, costing $20,000 when finally completed. The school census of this town shows 350 children of school age.

Folsom is situated in the northwest portion of the county, on same line of railway, is the second railroad town of importance in the county, and contains nearly as many people as Clayton. Formerly the United States land office was located here, but was removed to Clayton. Folsom has an altitude of over 6,000 feet and nestles near the mountains, surrounded by springs whose waters contain valuable medicinal qualities, and this town is becoming quite a health resort for many people from Texas and other States who come here during the summer season. Folsom has a fine public school building, built at a cost of $7,000; two very good hotels, and many stores and business houses. Folsom, like Clayton, has a large trade from the surrounding country, extending as far as 150 miles.

Other towns having post-offices, but off of the lines of railroad, are Veda, Capulin, Gallegos, Baca, Genova, Tequesquite, Albert, and many others of minor importance.

CATTLE.

Union County has 60,000 head of cattle within its borders. Many, if not the large majority, are well-graded cattle of the Hereford, Jersey, shorthorn, and other fine breeds.

SHEEP.

Three-quarters of a million sheep are now grazed in this county, many being Merinos and other well-known and valuable breeds. Scab is unknown among the sheep men here, and but few of these animals are lost here during the winter storms. The price of wool, sheep, and cattle having rapidly enhanced within a year, and these constituting the principal capital of the citizens of this county, the wealth of the county has kept the same pace.

SCHOOLS.

In all the school districts of the county the terms run from five to nine months, and every child within the confines of the county has the opportunity of acquiring at least a good common school education.

COAL.

Good coal is found in the northern part of the county, but owing to the nearness of other coal mines to the present railroad line no mines of coal have been developed, except such as the near-by settlers may do when removing coal for their immediate use.

HOMESTEAD LOCATIONS.

About two hundred homestead filings have been made at the Clayton land office during the past year, nearly all of which have been within this county, and while there is yet much valuable Government land here the indication is that the land containing living water will soon become individual property.

COST OF LIVING.

Exceptional inducements are offered the homeseeker in this county. Should he wish to engage in ranching, he may select his homestead from the thousand of acres of Government land at a cost of $16 for his 160 acres. He will find the expense of living not materially different from that in the East. Flour costs $2.80 per hundred; meats and grains are cheaper than they are in the far East, and groceries at prices charged in Denver or Kansas City, and in this climate of sunshine, after a few years, the summer heat of eastern districts, unknown in the arid portions of the West, and the rigors of severe winters of the Orient will hold out no inducement to him to leave the country of his adoption.

RAILROADS.

Union County is crossed by the Union Pacific, Denver and Gulf Railroad, a road running from Denver, Colo., to Fort Worth, Tex., a distance of 780 miles, which enters the county at a point near Folsom and leaves it at Texline, Tex. This road, which was built in 1888, has during the past five years improved greatly its roadbed and rolling stock until it has become one of the best roads in the West. Its passenger service is, because of its new and excellent coaches and fast-running trains, worthy of particular mention, and the traveler, leaving New Mexico one morning, reaches by close connections the city of Denver the same afternoon and Chicago the following evening. The road has, in way of improvements in Union County for the first six months of 1898, laid 10 miles of 65-pound steel in place of

52-pound rails; has fenced 41 track miles, or 82 linear miles; has ballasted 25 miles of roadbed 15 inches deep with cinders, besides building sheep-dipping plants at both Folsom and Clayton with a capacity of 10,000 sheep daily.

A new and roomy station has also been erected at Clayton, equipped with electric lights. This road is a most patent medium in moving New Mexico cattle to northern ranges, and thousands of head are driven annually from the Pecos River district, in southern New Mexico, to Clayton and Folsom, where they are shipped to Wyoming, Montana, and Eastern markets. In the fall of the year no less than 200,000 sheep are also carried by the Denver and Gulf road to Colorado feeding points.

POPULATION.

The population of Union County is about 7,000, almost without an exception prosperous and enterprising. Never in the history of the county has there been an appeal for assistance because of poverty by the inhabitants, nor is a pauper within the confines of Union County.

Neat residences, well kept, impress the visitor at once with the prosperity of Union County in general.

VALENCIA COUNTY.

Valencia County is one of the largest and oldest counties in the Territory of New Mexico; it reaches from the Arizona line on the west to the line of Guadalupe County on the east, and has a total area of 5,621,760 acres. Of this area about 3,000,000 acres make good pasture land, 1,000,000 acres are irrigable and fit for agricultural purposes, and about 750,000 acres are good timber lands.

At the present time there are at least 25,000 acres under cultivation in the county, of which a very small proportion is cultivated without irrigation.

The population of Valencia County is about 15,000 inhabitants, almost without exception prosperous and enterprising. Never in the history of this county has there been a pauper within it, and for law and order it is not surpassed by any county in the Territory, there not being a single person in the county jail, nor has there been any for the past year.

The county seat is Los Lunas, situated on the Atchison, Topeka and Santa Fe Railroad, 21 miles south of Albuquerque. Belen may be mentioned as another of the principal towns of the county, in the Rio Grande Valley, it having all modern improvements, including a fine roller mill, elegant stores, schoolhouses, and churches.

Valencia County is traversed by both the Atchison, Topeka and Santa Fe Railroad and the Santa Fe Pacific Railroad, the former going down the Rio Grande Valley and the latter traversing the western portion of the county into Arizona.

SCHOOLS.

Valencia County compares favorably with every other county in the Territory as to its school facilities, and while it may not have as fine edifices as in more pretentious counties, the average length of the school term is eight months in the year, and there is hardly a school district but what has plenty of funds at its command.

COAL AND MINERALS.

Coal has been found in several sections of the county, both east and west, and is of an excellent quality. In the western part of the county a good quality of onyx has been discovered. Large deposits of copper may be found in the eastern section, and gold and silver mines have been found in both the eastern and western sections of the county while in the Rio Puerco Valley there are some large beds of gypsum and a superior quality of building stone has also been found.

FARMING.

The largest amount of farming done in this county is confined to the valley of the Rio Grande, which river flows from north to south through the center of the county, although there are about 10,000 acres of land cultivated in the eastern and western portions. The soil of the Rio Grande Valley is extremely rich, and is being made better year by year by the application of river sediment which is brought onto the land by means of irrigation.

The principal products of this county are wheat, corn, oats, alfalfa, beans, and a large variety of fruits. Apples, peaches, and grapes grow to perfection in the lower valley. Grapes are grown in large quantities, and not only have we the justly celebrated Mission grape, but also several other varieties, as the Tokay, Sultana, Concord, Muscat, Gro Colmers, etc., which find a ready market at various eastern points.

The wheat grown near Los Lunas took the first prize at the World's Fair at Chicago over all competitors, and oats that were grown near Belen took the second prize, Russia taking the first.

Alfalfa crops bring good returns, and when properly handled produce from 1½ to 2 tons per acre at each cutting, and generally four cuttings are had each year, and ready sale, at good prices, is obtainable for all that can be produced.

On the western mesas of the county canaigre root is found in abundance, and as the demand for this root increases from year to year, for tanning purposes, an important industry will be developed in that line in the course of a few years.

Sugar beets have been planted in a small way in different parts of the county, and tests of them have given satisfactory results as to percentage of sugar, which is greater than that of a similar product grown in California, and careful estimates of which give indications of a yield of about 30 tons to the acre. As soon as a sugar factory can be established in the valley of the Rio Grande, a large portion of the farming land of the county may be devoted to beet raising.

STOCK.

In this county there are about 400,000 head of sheep, 25,000 head of cattle, and over 5,000 head of horses. The western as well as the eastern part of the county affords splendid pasture for stock whose owners, under the present prosperous conditions of the sheep and cattle business, are growing rapidly rich.

VALUATIONS.

The total assessed value of taxable property is $2,186,509.26; the debt, including all bonds issued, amounts to $106,982, and the rate of taxation is low.

THE PRESS.

Of the 19 counties in New Mexico, newspapers are published in 16. Cities, towns, and villages in which papers are published number 31, of which 15 are county seats. Of the 56 papers published in New Mexico 5 are daily, 1 triweekly, 47 weekly, and 3 monthly.

Politically the papers are divided as follows: Republican, 20; Democratic, 18; religious, local, etc., 11; independent, 8. The papers, particularly the dailies, have large circulations and are influential in their respective communities.

Much of the development of the Territory is due to the energy and enterprise of the newspaper men, which has been a labor of love, for in New Mexico, like in many other States and Territories of our Union, the newspaper business is not, from a purely financial standpoint, a lucrative one.

Following is a list of the newspapers printed in New Mexico:

Alamogordo, Otero County:	
Alamogordo News	Republican.
Albuquerque, Bernalillo County:	
Abogado Cristiano Neo Mexicano (Spanish and English)	Methodist.
Bandera Americana (Spanish)	Republican.
Citizen	Republican.
Citizen (weekly)	Republican.
Morning Democrat	Democratic.
News	Independent Republican.
Nuevo Mundo (Spanish)	Independent.
Aztec, San Juan County:	
San Juan County Index	Independent.
Bland, Bernalillo County:	
The Herald (Weekly)	Independent.
Cerrillos, Santa Fe County:	
The Rustler	Local.
Chloride, Sierra County:	
Black Range	Republican.
Clayton, Union County:	
Enterprise	Republican.
Union Democrat (English and Spanish)	Democratic.
Deming, Grant County:	
Headlight	Democratic.
East Las Vegas, San Miguel County:	
Optic (daily)	Silver Democratic.
Optic (weekly)	Silver Democratic.
Voz de Pueblo (Spanish)	Independent.
Eddy, Eddy County:	
Current	Democratic.
Pecos Valley Argus	Independent Republican.
Elizabethtown, Colfax County:	
New Mexico Miner	Silver Democratic.
Farmington, San Juan County:	
San Juan Times	Democratic.
Folsom, Union County:	
Independent	Silver Republican.
Gallup, Bernalillo County:	
Gleaner	Independent Democrat.
Hillsboro, Sierra County:	
Sierra County Advocate	Democratic.
Labelle, Taos County:	
Cresset	Independent.
Lascruces, Donna Ana County:	
Donna Ana County Republican	Republican.
Independent Democrat	Democratic.
New Mexico Collegian (monthly)	Collegiate.
Rio Grande Republican	Republican.
Southwestern Farm and Orchard (monthly)	Agricultural.
El Tiempo (Spanish).	

Las Vegas, San Miguel County:	
Independiente (Spanish)	Republican.
Optic (see East Las Vegas).	
Revista Católica (Spanish; edited by Jesuit fathers)	Catholic.
Stock Grower and Farmer	Stock and agriculture.
Lincoln, Lincoln County:	
News (English and Spanish)	Democratic.
Lordsburg, Grant County:	
Western Liberal	Republican.
Mora, Mora County:	
Anciano (Spanish)	Protestant.
Raton, Colfax County:	
Range	Republican.
Reporter	Democratic.
Red River, Taos County:	
Mining News	Independent.
Roswell, Chaves County:	
Record	Democratic.
Register	Independent.
San Marcial, Socorro County:	
Bee	Republican.
Santa Fe, Santa Fe County:	
Boletin Popular (Spanish)	
New Mexican (daily)	Republican.
New Mexican (weekly)	Republican.
Nuevo Mexicano (Spanish)	Republican.
Silver City, Grant County:	
Eagle	Democratic.
Enterprise	Republican.
Independent	Independent Democrat.
Socorro, Socorro County:	
Chieftain	Republican.
Industrial Advertiser	Democratic.
Springer, Colfax County:	
Colfax County Stockman	Democratic.
Tulerosa, Donna Ana County:	
Chief	Republican.
White Oaks, Lincoln County:	
Eagle	Democratic.

GAME AND FISH IN NEW MEXICO.

In the early days New Mexico was the paradise of the hunter and trapper. The earliest explorers of this Territory, and what is now the State of Colorado, in the first quarter of the present century, came here in the pursuit of their chosen calling of fishing, trapping, and hunting. The old trapper was a peculiar individual and many are the tales which are yet told by the oldest inhabitants of the adventures and experiences of Kit Carson, Bent, Williams, and their associates in the far West. The old Santa Fe trail for years to come will be an ever pleasant theme for song and story of those hardy explorers who were the precursors of the civilization which we now enjoy. The coming of the railroad and the great influx of settlers throughout the Rocky Mountain country deprived the old hunter and trapper of his means of sustenance and to-day he is but a memory.

In the early days, while yet the hostile Indians roamed the Great Plains, game of every kind was plenty. The buffalo, the deer, elk, bear, mountain lion, and all the smaller varieties of wild animals, were here on every hand. To-day the buffalo, like the old plainsman and hunter of the past, is only a tradition.

In the mountains, however, there are yet remaining deer, bear, mountain lion, and elk; turkey and grouse, beaver and big-horn sheep and mountain goats, as well as all the other smaller varieties of game

which attract the sportsman and the hunter. All of this class of game is to be found in the mountains, from Colorado on the north to the great spurs and ranges extending to and covering the extreme southern portion of New Mexico and the northern part of the Republic of Mexico. In the highest mesas and near the peaks of our greatest mountains are found the sheep, goat, and elk. In every mountain range of consequence in the Territory may be found the black, cinnamon, and silver-tip bear, the latter a small variety of the grizzly, but entertaining enough upon occasion to satisfy the true sportsman's heart to a nicety. It may truthfully be said that deer are comparatively in plenty in this Territory. The day was when great herds of antelope roamed the plains and valleys lying to the east of the main range of mountains in New Mexico, but to-day they are scarce, comparatively few remaining. Those which may be found are located in eastern Valencia, Bernalillo, and Guadaloupe counties, while some have been seen as far north as Union County and as far south as Lincoln, Chaves, Eddy, Otero, Donna Ana, Grant, and Sierra counties.

On the plains and in the valleys can be found quail, pheasants, Mongolian or Chinese pheasants, prairie chickens, and during the seasons geese, brant, ducks, plover, curlews, and snipe.

In every stream of consequence in New Mexico is found the Rocky Mountain trout. A gamer fish never rose to a fly. The principal streams where this delicious fish may be caught are the Pecos, Chama, Brazos, Navajo, Rio Pueblo, Santa Clara, San Antonio, Jemez, Los Pinos, Bonito, Mora, Sapello, Manuelitas, Gallinas, and Ponil, mostly in the northern and middle portions of the Territory and also in all the mountain streams in western Socorro and Sierra counties in the south. In some of the streams of Lincoln and Chaves counties are found great quantities of black bass, of a kind, however, not so gamy as his brother of the lakes and rivers in the North.

It may be safely said that there is yet remaining in the United States proper no place where game is more abundant or true sport more obtainable than in New Mexico.

The Territory, wisely anticipating the results caused by the inroads which are constantly being made upon the game everywhere throughout the Union, have passed very stringent laws relative to the slaughter and selling of game. The legislature of 1897 passed a very comprehensive law, by the terms of which it is unlawful to kill or wound, insnare or trap any elk, deer, antelope, fawn, mountain sheep, ibex, Rocky Mountain goat, or beaver within the boundaries of New Mexico, except that antelope and deer with horns may be shot during the months of September, October, and November of each year in the northern counties, and during October, November, and December in the southern counties. It is likewise unlawful to kill, wound, or insnare any quail, grouse, prairie chicken, pheasant, partridge, or wild turkey, except that such birds may be shot with a gun only during the months of September to February. The open season for fishing begins with June and ends with October of each year. The penalties for violation of the acts of 1897 are very severe and comparatively easy of enforcement, the burden of proof being upon the person charged with violation of the provisions of the act. In no event can any game be exposed for sale which has been killed within the limits of the Territory, and the burden of proving that any game or fish has been killed outside of New Mexico, when exposed by butchers and dealers in the markets for sale, is upon the dealers and butchers; a very wise provision, as experience in prosecutions has demonstrated.

A system of game wardens is established by the act; the wardens are appointed by the governor and they are clothed with the authority of making arrests, the same as the sheriffs of the several counties. The wardens hold their offices at the pleasure of the governor, and the executive is not restricted as to the number which he may appoint. Under this law the game of New Mexico is being thoroughly protected, not only for the benefit of our own citizens, but for any and all true sportsmen who may see fit to come here for a month's enjoyment of the hunting and fishing which is to be had in our mountains, mesas, plains, and streams.

A cordial invitation is extended to all of true sportsmen's instinct to a participation in the enjoyment of the sport of kings, with an assurance that the hand of welcome is always extended to those who come for the enjoyment and not to the abuse of the privilege.

The sportsmen visiting New Mexico need have no fear regarding accommodations, as proper conveyances can be secured at any point on the railroad by giving short notice, while at any of the principal towns he will find livery stables well supplied with teams and mountain wagons especially kept for the convenience of hunting and fishing parties, and who can furnish reliable drivers who are familiar with every desirable locality in their section of the Territory and whose charges are very reasonable.

RESOURCES.

The resources of New Mexico are boundless, and the possibilities of development in the Territory of New Mexico in numerous directions are unequaled by those of any other State or Territory in the Union. On account of the varied elevation almost everything that flourishes in the temperate zone, and many fruits that belong to the Tropics, grow to perfection in New Mexico. As a stock country it is excelled by none, in addition to which large, rich deposits of gold and silver, coal, iron, copper, sulphur, marble, building stone, and many different kinds of precious stones are found; New Mexico being the principal source of supply of the world for turquoise, which is of the finest quality and color. What we need to develop the mines, as well as the agricultural, stock growing, and other capabilities of our Territory is capital, and large fortunes are in store for those who have the money and industry to develop the wonderful resources of New Mexico. New Mexico needs more people; people who can invest in her mines and other industries which, if developed, would make our Territory one of the richest on the globe, and when the world at large becomes convinced of this, New Mexico will enter upon an era of prosperity never before dreamed of.

The ranges for sheep and cattle were never in better shape, and stock of all kinds is in excellent condition. The herds and flocks have increased in size and value very materially since the opening of the year, and with plenty of grass assured the sales of sheep and cattle this fall will bring large sums of ready money into the Territory.

Every prediction made for prosperity early in the year is now in a fair way to be fulfilled, and New Mexico will exceed almost all former yearly records in the amount of revenue derived from produce, sheep, and cattle at the close of the year's work.

UNDEVELOPED RESOURCES.

The Territory of New Mexico is a most inviting field for capital and skilled labor, having undeveloped resources almost without limit. Millions of acres of the finest agricultual land are yet to be reclaimed by the development and proper storage of water. Communication by enlarged and cheaper railroad facilities between the various portions of the Territory is earnestly hoped for, that an interchange of home products between the mining and agricultural sections may be carried on.

A large extent of New Mexico's rich mineral lands yet remains to be explored and developed. Her grazing lands have not been fully used, owing to the failure to develop artesian water (of which the finest in the world is found here) and erect surface windmills, the opportunities and conditions for which are excellent.

The opportunities of industrial life offer varied and profitable inducements to capital and labor, and the agricultural, mineral, and grazing wealth should receive from outside investors the attention they deserve.

Factories might also be started with profit. In this Territory there are many plants and grasses of indigenous growth that could be used in the manufacture of paper, bagging, rope, etc. Some of the hard woods growing in this Territory, at the base of the mountains, when dry take a beautiful polish, which produces a veneering of excellent quality. Eastern manufacturers could be supplied with this article who now obtain their product from other countries. A full report is given elsewhere on the lumber and forestry of our Territory.

Respectfully submitted.

MIGUEL A. OTERO,
Governor of Territory of New Mexico.

SANTA FE, N. MEX., *September 20, 1899.*

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WASHITA PARK, ADJOINING THE CITY OF CLOUD CHIEF

REPORT

OF THE

GOVERNOR OF OKLAHOMA.

EXECUTIVE DEPARTMENT,
TERRITORY OF OKLAHOMA,
Guthrie, October 1, 1899.

SIR: I have the honor to transmit herewith my annual report as the governor of Oklahoma Territory for the year ending June 30, 1899, detailing a record of prosperity and progress wonderful to contemplate in even this era of general prosperity for the whole nation.

A LAND OF PROSPERITY.

There is no place, section, or country where prosperity is so rampantly manifest as it is in Oklahoma. It is positively inspiring to see that country now and hear the reports of everyone in the extraordinary section, of the success which has followed every venture.

The above statement was the expressed opinion of James A. Davis, industrial commissioner of the Atchison, Topeka and Santa Fe Railway, after a complete tour of their extensive system a few weeks ago.

Oklahoma is prosperous and happy, and she invites all to come and share in her prosperity and joy. The story of the settlement and progress of the Territory reads almost like a chapter of the Arabian Nights; yet, the conquests of the past ten years but foreshadow a still greater advance, more wonderful achievements, more rapid strides in the future.

For general prosperity of all classes, rapid advancement, and bright prospects for the future Oklahoma stands to-day at the head of the great Commonwealths of America.

Another year of abundant crops for the farmer; of increase in value and number of the herds of the stock grower; of expanding business for the merchant; of building up of manufacturing industries; of extension of railways; of general growth in financial lines; of development of the manifold natural resources of the Territory, has realized the most optimistic predictions of the past; has made all of our people not only contented with their lot, but anxious that their relatives, friends, and old-time neighbors of the less prosperous and progressive States shall come and partake of this bounteous share of the good things of life.

With a population rapidly advancing toward the half million mark; with a fertile soil that successfully produces every crop of the temperate zone, except oranges and sugar cane; with an area in wheat greater than that of Great Britain; with a corn crop equal to many of

the great corn-growing States; with orchards and vineyards laden with fruit; with cattle upon a thousand hills; with a public school within reach of every home and a college education obtainable for every young man or woman; with 700 churches, 1,000 Sunday schools, and 150 newspapers; with an area greater than that of the six States of Vermont, New Hampshire, Massachusetts, Rhode Island, New Jersey, and Delaware; with a rapidly increasing taxable valuation and decreasing tax rate; with all lines of business in a prosperous condition; manufacturing industries growing rapidly and great natural resources on every side inviting development, Oklahoma offers inducements to the capitalist, the laborer, the professional man, the farmer, and the home seeker unequaled anywhere.

AREA, LOCATION, AND ALTITUDE.

Oklahoma is located in about the same latitude as Tennessee. The north boundary is 37° north latitude. Except in Greer County, little of the Territory extends south of the thirty-fifth parallel. With the exception of Beaver County, which extends in a strip 35 miles wide to the one hundred and third meridian, west longitude, nearly all of the Territory lies between 96° 30′ and 100° west longitude, being in the same belt as central Kansas and Texas.

In general, the face of the country is rolling prairie, with a considerable number of rivers and streams, usually flowing from the northwest to the southeast, and often having high and steep banks. In the eastern half there are considerable areas covered with timber, usually of the different varieties of oak. Timber is found in the valleys of the streams in all parts of the Territory.

The area of the Territory is 38,715 square miles, or about 26,000,000 acres, corresponding in size to the State of Ohio.

The altitude of the Territory ranges from about 800 to over 4,000 feet above the sea level, the greatest altitude being reached in the extreme west, the average being about 1,500 feet.

The country originally known as Oklahoma, or "Beautiful Land," contained less than 3,000,000 acres, comprising the larger portions of the counties of Kingfisher, Canadian, Oklahoma, Cleveland, Logan, and Payne. This land was thrown open by proclamation of the President, April 22, 1889, but a Territorial government was not provided until June, 1890, the 75,000 or more people being for over a year with no form of civil government save that devised and carried on by common consent, yet during this time there was no lawlessness prevalent, and there was never an hour in which property and life were not as safe as in any of the States.

The act creating the Territorial government created the county of Beaver, with an area of 3,681,000 acres, out of No Man's Land and attached it to Oklahoma.

In September, 1890, the Sac and Fox, Iowa, and Pottawatomie reservations, embracing 1,282,434 acres in the eastern part of the Territory, were thrown open to settlement, and the following spring the Cheyenne and Arapahoe lands of 4,297,771 acres were added. In 1893 came the opening of the Cherokee Outlet, with its 6,014,239 fertile acres, in 1895 the Kickapoo Reservation of 206,662 acres, and early in 1896 Greer County, a small empire in itself, was added by a decision of the Supreme Court of the United States, giving the Territory its present settled area of something over 19,000,000 acres, 6,949,715 acres being still included in Indian and other reservations.

THE SETTLER'S FIRST HOME.

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OKLAHOMA FARM HOME OF TO-DAY.

A VISITOR'S OPINION.

After a recent visit to Oklahoma, the editor of the Iola (Kans.) Register spoke of the Territory as follows:

One of the most surprising things to one who has been visiting Oklahoma once or twice a year for the past ten years is the rapidity with which the country has yielded to civilization. The soil itself, we mean. Only ten years ago a virgin prairie, or a spreading forest, now the sod has disappeared almost as completely as it has in Kansas, and the fields are as mellow and as obedient to the plow as if they had not felt the foot of the buffalo for a hundred years.

Just now Oklahoma is harvesting one of the greatest wheat crops in acreage and yield of her history. The Strip is practically one wheat field, and one could drive all day without losing from his ears the pleasant hum of binders, or from his eyes the pleasant sight of acres of shocked or waving grain. South and east of the Strip the country is not so unanimously given over to wheat, the land being pleasantly diversified with corn and cotton and castor beans. How can a country help being rich when it combines within its own range of possibilities—almost of certainties—staple crops of three distinct zones. Cotton has made the South rich, wheat has enriched the North and West, and corn has brought wealth to the central Mississippi States. Oklahoma can raise as much and as good cotton as Georgia, as much wheat as Kansas, and as much corn as Illinois. What wonder is it, then, that already the houses on nearly all the farms are big, substantial, handsome homes; that the big red barn is much in evidence, that there is a top buggy in the shed and a bicycle on the front porch. Oklahoma is a great country.

POPULATION.

No enumeration of the inhabitants of the Territory has been taken during the past year. In 1898 the enumeration was as follows:

County.	Population.	County.	Population.
Beaver	2,548	Logan	23,589
Blaine	8,527	Noble	10,421
Canadian	18,336	Oklahoma	20,324
Cleveland	15,426	Pawnee	10,795
Custer	6,482	Payne	17,396
Day	843	Pottawatomie	22,594
Dewey	4,126	Roger Mills	2,262
Garfield	16,228	Washita	9,409
Grant	14,319	Woods	24,414
Greer	10,132	Woodward	4,206
Kay	18,000	Reservations	13,033
Kingfisher	16,044		
Lincoln	21,884	Total	311,400

This enumeration was made by the local assessors, and as they are known to miss most of those who do not list property for taxation, the population was undoubtedly, at that time, somewhat in excess of the figures given above.

Considering the fact that within the past year incoming settlers took up nearly three-fourths of a million acres of Government land; that cities of the first class have sprung up where a year ago were cornfields; that the school population has increased over 12 per cent; that every day new immigrants can be seen coming into the Territory, it appears to me that 375,000 is a very conservative estimate of the population of the Territory at this time.

While there is a light sprinkling of the foreign element among the late immigrants settling in the Territory, the great majority are American born, as are, I believe, fully 90 per cent of the people of the Territory.

Our people are all progressive, energetic, and industrious, and the newcomers during the past year have, as a rule, been of a most desirable class—farmers, stock raisers, business, and the more progressive

laboring men of other States seeking new locations, new homes, new opportunities. They come with money to purchase and stock farms, to build homes, or establish new and complete lines of business, giving added impetus to the rapid development and upbuilding of the Territory.

TAXABLE PROPERTY.

The assessed valuation of the Territory for 1899 is as follows:

County.	Amount.	County.	Amount.
Beaver	$1,341,267	Logan	$4,131,921
Blaine	505,711	Noble	1,576,576
Canadian	4,356,858	Oklahoma	4,421,699
Cleveland	1,775,142	Pawnee	1,600,708
Custer	1,051,638	Payne	2,169,851
Day	399,668	Pottawatomie	1,784,448
Dewey	498,995	Roger Mills	679,558
Garfield	2,084,001	Washita	892,952
Grant	1,820,615	Woods	2,321,304
Greer	1,622,404	Woodward	1,883,864
Kay	2,192,071		
Kingfisher	2,086,002	Total	42,982,414
Lincoln	1,835,070		

This shows an increase of $2,358,598 over the valuation of 1898, after the same had been raised by the Territorial board of equalization to what they deemed a fair and equitable valuation.

This large increase justifies the action of the board last year and refutes all of the arguments and statements as to the raise being unjustifiable.

In every county the valuation put upon property for taxation is much below the actual cash value, and the real taxable valuation of the Territory is not less than $75,000,000.

In connection with the subject of taxable property and tax rates, the following table will be of special interest, showing, as it does, how small a percentage of the land which is occupied and cultivated, and from which abundant crops are realized, is now included in the tax lists:

County.	Acres listed for taxation.	Acres filed on by settlers.	Per cent of land filed on listed for taxation.	Value of farm land listed for taxation.	What value would be if all lands filed on were listed.
Beaver	94,764	234,000	36	$147,380	$409,800
Blaine	16,445	547,000	3	45,798	1,526,400
Canadian	259,742	454,000	57	899,834	1,578,600
Cleveland	218,677	328,000	67	734,087	1,095,500
Custer	10,112	565,000	2	20,767	1,038,300
Day	4,245	108,000	4	9,005	225,000
Dewey	3,373	440,000	¼	12,980	1,500,000
Garfield	111,765	565,000	19	487,497	2,565,700
Grant	74,500	595,000	13	293,988	2,261,000
Greer	73,233	843,000	8½	139,947	1,550,000
Kay	46,655	520,000	9	222,195	2,468,800
Kingfisher	320,488	460,000	69	771,187	1,119,000
Lincoln	116,723	520,000	22	445,075	2,023,100
Logan	370,491	440,000	84	1,786,755	2,127,100
Noble	15,087	365,000	4	59,055	1,491,100
Oklahoma	307,083	415,000	74	1,345,702	1,813,100
Pawnee	5,777	300,000	2	38,897	1,919,300
Payne	224,651	462,000	48	1,042,099	2,172,300
Pottawatomie	70,208	467,000	15	197,416	1,316,100
Roger Mills	5,325	533,000	1	25,585	2,528,500
Washita	10,800	590,000	2	19,976	908,800
Woods	36,650	1,320,000	3	114,111	3,803,700
Woodward	28,320	680,000	4	52,925	1,313,100
Total	2,396,044	11,751,000	20	8,912,291	44,561,400

TAXES.

Nowhere in Oklahoma are the taxes oppressive. The Territorial tax is less than that of most of the States of the Union, being but 5.2 mills for all purposes, divided as follows:

General Territorial tax, 3 mills; University tax, one-half mill; Edmond Normal School, one-half mill; Alva Normal School, one-half mill; Agricultural and Mechanical College, one-tenth of a mill; Colored Agricultural and Normal University, one-tenth of a mill; for the care and education of the deaf and dumb, two-fifths of a mill; for the care and education of the blind, one-tenth of a mill.

To this is, of course, added in each locality the appropriate county, township, and school district tax, which is governed by the needs of the particular locality, but in no case is the total rate out of proportion to the immediate benefits derived. It is a significant fact that in almost every county the rate is being materially reduced each year. The issuance of patents to Government lands, so large a proportion of which are as yet untaxable, the rapid growth of taxable wealth in all parts of the Territory, and the greater stability of the inhabitants will result in steady reduction each year for some years to come.

TERRITORIAL INDEBTEDNESS.

The financial condition of the Territory, as shown by the books of the treasurer on June 30, 1899, was as follows:

Warrants outstanding June 30, 1898	$236,262.51
General-fund warrants issued from July 1, 1898, to June 30, 1899	146,752.44
Accrued interest on outstanding general-fund warrants (estimated)	19,733.00
	402,747.95
Warrants redeemed and cash in treasury June 30, 1899	112,711.56
Outstanding June 30, 1899	290,036.39

Interest paid for year ending June 30, 1899.

On bonded debt	$2,880.00
On general-fund warrants redeemed	9,899.11
On normal-school warrants redeemed	546.06
On university warrants redeemed	714.13
Total interest paid	14,039.30

In addition to this outstanding warrant indebtedness the Territory has a bonded indebtedness of $48,000, incurred in the first year, to erect institutions of learning.

PUBLIC SCHOOLS.

With considerable over 100,000 school children within her borders Oklahoma may well consider her school interests the most important of all. The first settlers of the Territory, believing that in the public schools lay the safety of the nation, built or rented school buildings and established subscription schools long before there was any law governing the Territory or providing for schools or other public buildings. When laws were enacted those first thought of were for schools and educational institutions, and the first taxes levied and first bonds issued were for schools and school buildings. It has long been the boast and pride of Oklahoma that the only bonded debt of the Territory was that incurred before she was a year old, to erect college buildings, and the first public building erected in the Territory was a

schoolhouse. A penitentiary we have gotten along without, jails were slow in building, poorhouses we have none, but schoolhouses are everywhere, nearly 2,000 of them capping the hilltops or dotting the valleys of the Territory. At first many of the district school buildings were of logs or sod, and the appliances of primitive sort, but to-day almost every district in the Territory has a good, substantial school building of frame, brick, or stone, every city has a high school, and five magnificent Territorial structures open their doors to the young men and women seeking, by a higher education, to better fit themselves for the work and enjoyment of life.

The public-school system of the Territory is under the general supervision of the Territorial superintendent of public instruction, who, with the Territorial board of education molds the educational policy and directs the educational interests of the Territory. It has been the policy of these officers to foster and improve the district or rural schools as far as possible.

Three and one-half years ago the Territorial board of education prepared and had printed in the normal institute manual for that year, a graded course of study for the common schools of Oklahoma. Some months later 20,000 copies of this course of study were printed in pamphlet form and sent to the county superintendents to be distributed among the rural schools. Along with this a system of classification records was recommended, the purpose of these records being to show succeeding teachers the condition of the school and the standing of each pupil. It enables the teacher to know, before opening school the first day, where each pupil belongs in each branch, what work the preceding teacher was doing, her plans, etc., so she can follow up the plan without a general upsetting of the preceding teacher's work and putting the pupils back. With this system a systematic record of each pupil's progress is kept, thus binding term to term, in a manner that economizes time and makes more sure the success of the succeeding teacher. This system and method on the part of the teacher encourages methodical work on the part of the pupil. The teachers are also provided with blank forms to be used in making term reports to the county superintendent, the information contained in the teacher's term report to the county superintendent being substantially that left for use of the succeeding teacher. A full history of the school life of each pupil thus becomes a part of the permanent records in the district and the county superintendent's office. There has been a gradual improvement in the classification in the country schools in Oklahoma during the last three years. The pupils are now fairly well classified. We have heard some of the presidents of our Territorial institutions and city superintendents say that pupils coming to their schools from the country are fairly well fitted in the branches they have studied. These instances are sufficiently numerous to show that our country schools can do good work, and that in many of these schools good work is being done.

But the crowning feature of country-school gradation is yet to be told. A course of study implies an end as well as a beginning, so when the course is completed a common-school diploma is awarded. A worthy object is here placed before the pupil, an object which by industry and perseverance he may gain. It awakens his interest and he determines to complete the course and thus makes better application of his time. Examinations are held annually under the direct management of the Territorial board of education. The first examination was held on May 1 and 2, 1896, the second on May 4 and

5, 1897, the third on March 24 and 25, 1898. The result of the first examination was 207 graduates from 9 counties; the second, 173 from 11 counties; the third, 187 from 14 counties. Graduation from the district schools has proven a success in Oklahoma and will be continued.

No one need have any fears in coming to Oklahoma that excellent educational advantages for his children can not be secured, either in the country or in the cities and villages. Not a few districts have availed themselves of the privileges extended by act of the third legislative assembly authorizing two or more districts to establish and maintain a high school. All the cities, and most of the smaller towns, offer in addition to the regular common-school courses a high-school course free.

The design is to have these high schools prepare the students for entrance into the university, the normal school, or agricultural and mechanical college, thus connecting all public schools and colleges and making one complete system of schools, from the lowest to the highest.

In districts where there are colored children, separate schools are maintained for their instruction.

The standard of teachers in Oklahoma is about that of any of the States, and the legal requirements are such that only teachers of real worth can receive a permanent foothold in the schools of the Territory. This high standard, together with the liberal wages usually paid, has attracted a great number of teachers to the Territory from the older States, and numerous applications are continually received from outside teachers. The close watch educators of the country keep upon Oklahoma and their anxiety to come here is shown by the fact that recently when it became known that the board of education for the normal school had four or five places to fill on the faculty of the Northwestern Normal School, there were over 300 applicants, representing 19 different States.

There are in the Territory 1,929 school districts, as shown in the following table, which also gives interesting information as to the number holding school the past year, length of term, etc.:

Schools taught during the fiscal year ending June 30, 1898.

County.	Organized districts.	Districts in which schools were taught.	Schools taught.	Days schools were taught.	Average length of school in days.
Beaver	42	39			
Blaine	80	80	73	5,480	75
Canadian	96	91	92	10,800	117
Cleveland	69	68	86	7,420	86
Custer	52	51	52	4,500	86
Dewey	48	39	39	2,670	68
Day	13	13			
Garfield	124	119	140	9,780	70
Grant	121	121	118	11,100	94
Greer	71	68	56	4,780	85
Kay	88	87	87	9,280	106
Kingfisher	120	118	123	11,760	96
Lincoln	134	132	152	11,040	75
Logan	97	97	134	14,800	110
Noble	59	59	61	4,876	79
Oklahoma	82	79	126	9,200	73
Pawnee	63	62	63	4,650	74
Payne	99	99	111	11,110	101
Pottawatomie	102	102	104	8,520	82
Roger Mills	20	12	13	1,010	77
Washita	61	60	63	4,870	77
Woods	231	223	224	16,846	70
Woodward	57	53	45	4,140	92
Total	1,929	1,772	1,962	168,606	792

I give also a number of tables of useful and interesting information relative to the schools and school work of the Territory:

Enrollment in public schools in the year 1898.

County.	White.			Colored.			Total.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Aggregate.
Beaver	231	224	455	1	-------	1	232	224	456
Blaine	1,146	1,042	2,188	141	152	293	1,287	1,194	2,481
Canadian	1,871	1,724	3,595	42	57	99	1,913	1,781	3,694
Cleveland	2,153	2,080	4,233	43	41	84	2,196	2,121	4,317
Custer	830	739	1,569	-------	2	2	830	741	1,571
Dewey	453	447	900	-------	-------	-------	453	447	900
Day	147	153	300	-------	-------	-------	147	153	300
Garfield	2,123	1,937	4,060	13	20	33	2,136	1,957	4,093
Grant	1,914	1,882	3,796	4	6	10	1,918	1,888	3,806
Greer	1,224	1,165	2,389	-------	-------	-------	1,224	1,165	2,389
Kay	2,583	2,347	4,930	12	13	25	2,595	2,360	4,955
Kingfisher	2,049	1,915	3,964	298	274	572	2,347	2,189	4,536
Lincoln	2,907	2,566	5,373	158	170	328	2,065	2,736	5,701
Logan	2,395	2,146	4,541	742	853	1,595	3,137	2,999	6,136
Noble	1,193	1,148	2,341	46	36	82	1,239	1,184	2,423
Oklahoma	2,286	2,114	4,400	335	368	703	2,621	2,482	5,103
Pawnee	1,531	1,446	2,977	45	53	98	1,576	1,499	3,075
Payne	2,373	2,132	4,505	42	35	77	2,415	2,167	4,582
Pottawatomie	2,860	2,689	5,549	105	85	190	2,965	2,774	5,739
Roger Mills	168	205	373	-------	-------	-------	168	205	373
Washita	1,361	1,167	2,428	2	-------	2	1,363	1,167	2,430
Woods	3,654	3,441	7,095	18	12	30	3,672	3,453	7,125
Woodward	542	494	1,036	-------	-------	-------	542	494	1,036
Total	37,694	35,203	72,899	2,047	2,177	4,224	39,741	38,215	77,121

Average daily attendance for the year ending June 30, 1898.

County.	Male.	Female.	Total.
Beaver	153	149	302
Blaine	541	614	1,165
Canadian	1,178	1,106	2,284
Cleveland	2,196	2,121	4,317
Custer	526	498	1,025
Dewey	329	393	722
a Day	-------	-------	-------
Garfield	1,448	1,355	2,803
Grant	1,316	1,340	2,656
Greer	702	707	1,409
Kay	1,690	1,490	3,060
Kingfisher	1,478	1,407	2,881
Lincoln	1,627	1,549	3,176
Logan	1,808	1,911	3,719
Noble	721	777	1,498
Oklahoma	1,591	1,658	3,249
Pawnee	1,056	1,039	2,095
Payne	1,191	1,155	2,346
Pottawatomie	1,513	1,504	3,017
Roger Mills	116	137	254
Washita	867	825	1,692
Woods	2,400	2,422	4,822
Woodward	357	345	702
Total	24,744	24,443	49,184

a No report.

Enumeration of persons between the ages of 6 years and 21 years for the year 1898.

County.	White.			Colored.			Grand total.
	Male.	Female.	Total.	Male.	Female.	Total.	
Beaver	435	436	871	1	1	2	873
Blaine	1,156	1,021	2,177	143	152	295	2,472
Canadian	2,224	2,044	4,268	61	79	140	4,408
Cleveland	2,905	2,701	5,606	91	77	168	5,774
Custer	1,125	1,028	2,153	12	18	30	2,183
Dewey	731	713	1,444	.....	.....	.....	1,444
Day	217	147	364	.....	.....	.....	364
Garfield	2,647	2,534	5,181	35	50	85	5,266
Grant	24,259	2,350	4,775	13	20	33	4,808
Greer	190	1,718	3,627	1	.....	1	3,628
Kay	976	2,096	5,672	40	21	61	5,733
Kingfisher	2,477	2,390	4,867	452	401	853	5,720
Lincoln	2,869	3,371	7,240	275	285	560	7,800
Logan	2,869	2,614	5,483	833	872	1,705	7,188
Noble	1,470	1,378	2,848	78	65	143	2,991
Oklahoma	3,136	2,884	6,020	452	448	900	6,920
Pawnee	1,949	1,823	3,772	121	109	230	4,002
Payne	3,068	2,792	5,830	145	90	235	6,065
Pottawatomie	4,417	3,990	8,407	127	102	229	8,636
Roger Mills	405	428	833	26	27	53	886
Washita	1,814	1,633	3,447	72	65	137	3,584
Woods	4,732	4,430	9,162	33	25	58	9,220
Woodward	799	710	1,509	.....	.....	.....	1,509
Total	49,725	45,831	95,556	3,011	2,907	5,918	101,474

This shows an increase of over 10,000 over the enumeration of the previous year. At this time the school population is probably 115,000.

Number of teachers employed and the average salary paid for the year ending June 30, 1898.

County.	Male.	Female.	Total.	Average salary paid.		
				First grade.	Second grade.	Third grade.
Beaver	14	28	42	$35.00	$29.44	$27.70
Blaine	27	47	74	30.00	25.00	21.25
Canadian	30	68	98	53.41	34.95	28.97
Cleveland	50	42	92	47.16	35.83	23.18
Custer	15	36	51	26.11	21.63	21.52
Dewey	11	30	41	22.50	21.62	18.57
a Day	.....	.....	.....	.....	.....	.....
Garfield	55	64	19	33.75	28.90	27.13
Grant	47	75	122	33.00	26.51	26.50
Greer	27	31	58	44.00	29.63	30.00
Kay	43	68	111	41.00	34.25	28.50
Kingfisher	51	91	142	.....	.....	.....
Lincoln	75	77	152	28.34	28.10	24.29
Logan	53	88	141	42.41	32.36	20.69
Noble	29	39	68	62.50	.....	.....
Oklahoma	44	87	131	45.50	37.00	25.50
Pawnee	17	52	69	24.50	23.33	.....
Payne	52	78	130	35.00	29.33	24.92
Pottawatomie	66	49	115	39.00	32.38	31.08
Roger Mills	7	6	13	45.42	34.17	25.66
Washita	30	30	60	32.78	31.70	27.06
Woods	83	147	230	29.64	24.68	23.01
Woodward	15	33	48	34.05	29.17	28.01
Total	841	1,266	2,107	.....	.....	.....

a No report.

Receipts for the year ending June 30, 1898.

County.	Balance on hand June 30, 1898.	From apportionment of Territory and county school fund.	District tax.	Sale of bonds.	Other sources.	Total receipts.
Beaver	$2,598.87	$3,688.50	$3,887.06	.....	$433.20	$10,607.63
Blaine	973.28	3,070.05	5,317.83	.....	.....	9,361.16
Canadian	5,779.42	5,815.77	22,650.57	.....	1,733.11	35,978.87
Cleveland	6,553.39	11,667.91	14,367.83	$1,829.50	46.70	34,465.33
Custer	481.51	2,367.80	5,729.72	.....	176.45	8,755.48
Dewey	687.32	1,601.18	2,044.50	.....	.....	4,333.00
a Day	.....	.....	.....	.....	.....	.....
Garfield	1,088.55	6,524.32	11,680.37	966.65	1,268.07	21,527.96
Grant	3,752.14	11,148.40	15,480.41	5,693.00	462.35	36,516.30
Greer	1,027.76	3,912.15	7,949.06	.....	1.14	12,890.11
Kay	4,438.46	9,839.89	24,112.57	.....	.....	38,390.92
Kingfisher	7,917.90	7,614.34	25,976.24	1,317.05	184.81	43,010.34
Lincoln	6,178.52	9,206.11	17,125.61	1,548.98	210.36	34,269.58
Logan	8,846.13	14,100.24	24,403.37	1,329.00	3,969.07	52,667.81
Noble	3,522.14	5,881.11	10,342.83	127.24	664.88	20,538.20
Oklahoma	5,931.94	10,803.03	31,793.66	.....	57 41	48,586.04
Pawnee	1,180.03	4,875.57	7,515.61	882.00	530.01	14,983.22
Payne	1,105.45	9,981.82	18,235.69	2,358.25	414.75	32,095.96
Pottawatomie	3,431.94	11,402.27	17,358.40	1,080.00	2,776.02	36,058.63
Roger Mills	959.33	1,408.53	2,020.54	.....	16.00	4,404.40
Washita	7.86	3,699.31	5,400.30	.....	695.92	9,803.39
Woods	5,523.47	15,392.15	18,399.45	.....	442.08	39,757.15
Woodward	3,408.46	5,842.38	11,386.19	.....	619.65	21,256.68
Total	75,393.87	159,842.83	303,167.81	17,111.77	14,721.98	570,238.16

a No report.

Expenditures for the year ending June 30, 1898.

County.	Teachers' salaries.	Sites, buildings, and furniture.	Rents, repairs, and incidentals.	Libraries and apparatus.	Other purposes.	Total expenditures.	Balance on hand June 30, 1898.
Beaver	$5,644.97	$95.97	$500.05	$264.14	$1,084.71	$7,589 84	$2,933.56
Blaine	5,681.90	375.96	766.95	132.22	471.27	7,428.30	1,932.86
Canadian	22,265.73	1,689.87	3,314.08	1,196 93	872.56	29,339 17	7,277.55
Cleveland	19,695.50	4,865.44	2,226.02	170.07	1,079 52	28,036.55	4,394.12
Custer	5,953.87	834.85	545.55	37.98	60.77	7,433 02	1,520.07
Dewey	2,916.13	.....	553.61	.....	.....	3,469.74	767 14
Day	.....	.....	.....	.....	.....	.....	730.11
Garfield	6,865.54	1,176.38	1,122.96	78.25	1,149.50	10,392.63	871.16
Grant	16,409.50	7,502.00	.....	.....	.....	23,911 50	5,407.28
Greer	8,064.38	448.22	698.09	.....	16.20	9,226.89	1,462.21
Kay	.....	.....	.....	.....	.....	.....	9,818.26
Kingfisher	24,326.86	3,751.32	4,808 37	1,233.79	1,502.95	35,623.29	7,387.04
Lincoln	16,788.33	7,118.37	2,609.20	153.88	736.91	27,406.69	6,870.89
Logan	28,377.38	4,238.86	2,713.28	1,251 41	5,856.88	42,437 79	10,228.02
Noble	9,738.63	2,413.85	1,453.45	130.90	2,832.33	16,569 16	3,041.80
Oklahoma	31,791.73	336.44	4,065.17	407.52	4,468.72	41,069.58	7,516.36
Pawnee	6,923.39	1,753.06	862.24	191 41	970.13	10,700.23	2,575.29
Payne	16,860 78	4,661.37	2,684.51	992.26	1,282 64	26,481.46	3,856.40
Pottawatomie	23,190.07	3,936.15	3,067.04	557.03	1,517.52	32,257.81	2,573.20
Roger Mills	2,171.57	42.61	207 95	81.28	587.24	3,090.65	1,220.75
Washita	7,519.05	88.25	20.75	.....	167.55	7,795.60	2,000.53
Woods	22,042.50	2,715.45	3,716.23	582.91	2,009.43	31,066.52	7,234.40
Woodward	7,824.92	2,948.31	882.52	50.51	2,314.55	14,020.81	7,331.84
Total	291,052.71	50,992.63	36,808.02	7,512.49	28,981.38	415,347.23	98,950.84

Comparative showing of public schools in cities of the first class for the school year 1898.

City.	Teachers.	Average salary paid.	Total enumeration.	Total enrollment.	Total average attendance.	Months in school year.	School-houses.	Volumes in library.	Value of library.
El Reno	15	$45.16	701	731	448	8	6	142	$34.00
Guthrie	27	38.13	2,028	2,145	1,110.6	8	5	450	250.00
Kingfisher	11	35.00	646	494	320.3	8	4	200	.....
Oklahoma City	25	42.00	2,100	1,350	896	9	4	300	100.00
Perry	10	41.00	715	611	391	8	3	15	30.00
Shawnee	12	38.00	1,001	844	437	7½	3	10	25.00

Schools in cities of first class beginning fall term of 1898.

City.	Teachers.	Average salary.	Months in school year.	Volumes in library.	Value of library.	Superintendent.	Annual salary.	School-houses.
El Reno	15	$45.16	8	142	$86.40	L. W. Cole	$1,000.00	6
Guthrie	29	42.15	9	450	250.00	J. R. Campbell	1,000.00	5
Kingfisher	12	41.40	8	200	.....	C. H. Roberts	1,080.00	4
Oklahoma City	27	43.00	9	300	100.00	B. F. Nihart	1,200.00	4
Perry	9	43.33	9	15	30.00	N. L. Falls	675.00	2
Shawnee	15	38.33	8	10	25.00	J. H. Ware	900.00	3

HIGHER INSTITUTIONS OF LEARNING.

The higher institutions of learning are all in a flourishing condition, well conducted and well attended, and it gives me pleasure to be able to state that by action of the boards of regents and board of education all of these higher institutions are now open to students from the Indian Territory upon exactly the same terms as those from Oklahoma.

UNIVERSITY OF OKLAHOMA.

The University of Oklahoma was opened for the reception of students September 6, 1892. Sixty-nine pupils were enrolled at the opening. The sessions of the school were held the first year in a rented building. The second year school was conducted in the new building that was just completed. This building is located on a beautiful elevation southwest of Norman, a growing town of 3,000 inhabitants, the county seat of Cleveland County. The building is of stone and pressed brick and contains 20 recitation and reception rooms and a large assembly and library room. The campus, consisting of 40 acres, is being rapidly improved. At present 12 acres have been planted to trees, which are in a growing, thrifty condition. The University of Oklahoma is supported by a general tax of one-half mill levy on each dollar of valuation on the assessment rolls of the Territory. In addition to this support, section 13 in each township in what is known as the Cherokee Outlet was reserved from settlement for university, normal school, and agricultural college purposes in the proclamation of the President of the United States opening those lands to settlement. The lands so reserved have been appropriated for the above purpose by act of Congress, and have been leased for the benefit of the institutions named. The purpose of the Territory, as expressed in the law providing for the organization and support of this institution, is to furnish, practically free, to the young men and women of the Territory the privilege of the higher education. Its

courses of study are prepared with the view of articulating closely with the work done by the public-school system, so that the courses provided by the Territory may be continuous from the lowest primary in the public schools to the highest class in the university. During the past year decided progress was made in developing and extending the resources of the institution. A department of biology and kindred subjects has been established, and equipped for work with the best modern apparatus. The library has received an addition of something like a thousand volumes, and the space for its work enlarged. The enrollment in the different departments for the past year was as follows:

College of arts:	
Graduate students	2
Seniors	3
Juniors	2
Sophomores	7
Freshmen	18
Specials	4
Pre-medical department	4
School of pharmacy:	
Second year	5
First year	17
School of music	25
Preparatory school:	
Senior year	31
Middle year	44
First year	114
Summer school	96
	374
Number included under two heads	38
Total	336

Classified as to occupation of parents:

Farmers	193
Merchants	23
Physicians	11
Carpenters	11
Lawyers	12
Ministers	8
Teachers	4
Butchers	3
Mechanics	3
Millers	3
Blacksmiths	3
Masons	3
Real estate agents	3
Bankers	2
Insurance agents	2
Lumbermen	2
Miscellaneous	31

The prospective number of students for the coming year is 400.

The average age of the pupils in the school during the past year was higher than for former years, owing to the fact that more young men and women, who came into the Territory as children and who were deprived of school privileges in the early years of settlement, have now come into the school to secure what education they can. The preceding table, showing the classification of students as to occupation of parents, indicates the walks of life from which the students largely come. Fifty or 60 per cent of the students earn their own way wholly or in part. More students each year form a purpose to

complete an advanced education as a preparation for life's work. This spirit has been characteristic of all students here, even those who were able to attend but a short time. The work of the university is becoming generally understood among the citizens of Oklahoma, and the patronage is becoming more general over the Territory.

The faculty of the institution includes 15 educators, of recognized standing and ability, determined to make the university second to none. I quote the following from the Yearbook of the University, recently issued, as outlining fully the policy and aims of the institution:

TO THE PUBLIC:

The board of regents and faculty cordially invite the attention of the public to the plans and purposes of the University of Oklahoma.

The people of the Territory pay a regular tax for the purpose of furnishing, practically free, to their young men and women instruction of the highest order. This conception will be carried into effect to the limit of the resources of the institution. Believing it to be as much a part of the public-school system of the Territory as any public school, the management proposes to unite with the public-school system of the Territory in making its work articulate with the work of the graded elementary schools, so that the course of study provided by the Territory may be continuous from the lowest primary in the public schools to the highest class in the university. It is their wish to furnish information to all who are interested in knowing about its work and resources, as well as to those who contemplate an advanced course of study. The president will be particularly interested in corresponding with anyone who may desire an education, but who may feel either that his means will not permit such a course or that the time required for completing a course of study may be too long for his time of life. It is hoped that no one will conclude that he is too poor or too old to take a course of study until after he has gone over the matter in correspondence with the president or some member of the faculty. Since this institution is established and maintained by the Territory for its citizens, we desire to have each family in the Territory inform us as to what the university can do for the young men and women who are to be its future citizens and who will control the destiny of the future State.

OKLAHOMA NORMAL SCHOOL.

The legislature of 1891 enacted that the "Normal School for Oklahoma" be located at Edmond, an ideal college town on the Santa Fe, midway between Guthrie and Oklahoma City. Oklahoma County donated $5,000 in bonds; Edmond gave 40 acres of land and bonds amounting to $2,000. With this small amount the building was begun in the summer of 1892. The legislature of 1894 donated an additional amount for the completion of the building. In the past eight years many valuable improvements have been made, until to-day we have a fine and commodious structure, of brick and red sandstone, costing upward of $50,000. With broad halls and well-equipped class rooms heated by the Smead system, it offers every opportunity to student and teacher. During the summer vacation the entire building will undergo extensive improvements; much new apparatus will be added to the laboratories and many valuable books to the library.

The normal school is maintained by a half-mill levy on the assessed valuation of the Territory and one-fifth of the rentals arising from section No. 13 in the Cherokee Outlet, according to the proclamation of the President of the United States.

The special function of the normal school is to train and equip teachers. However, a liberal course of study affords to those not wishing to teach ample opportunity for a broad and liberal education. The diploma of graduation is a five-year certificate in Oklahoma, and is renewable by the Territorial superintendent upon evidence of satisfactory work in teaching. Tuition in all departments is free.

The first school year opened November 9, 1891, with 23 students in attendance. The attendance has gradually increased until last year it reached 250, the largest enrollment of any Territorial institution. The prospects for the coming year are very flattering, many of the young men and women of the Territory who look forward to a life work in the profession of teaching having signified their intention of attending. However, the limited facilities of the town of Edmond lessen the attendance. It is hoped that at an early day the board will see its way clear to build boarding halls, where students may be accommodated as well as at home.

The spirit of the institution is indicated by the work of the graduates. The first class graduated in 1897, consisting of 5 members. The class of 1898 numbered 11; of 1899, 10. Nearly all of these are either laboring in the schools of Oklahoma or attending some Eastern institution in order to qualify themselves more thoroughly for teaching in our schools.

The average age of students last year was 20, and is increasing year by year. A notable fact worthy of consideration is that the great mass of our students come from the farm, and truly may it be said, "This is the farmers' school." Another fact worthy of note is the growth in the spirit and demand for a higher education. As our people advance in the sharp struggle for life and accumulate a small competence, they are desirous of specially trained teachers, and this for the advancement of their own children. Nearly all of our students labor in the field, thus by their own hands earning the means to realize their ambition for advanced training. The earnestness of purpose, the consecration of life to the work, the honesty and uprightness of the daily conduct of students is commendable.

The faculty, now strong and well organized, consists, besides the president, of five gentlemen and four ladies, all able educators.

The school year is of ten months, divided into convenient terms. The outlook for increased attendance next session is most encouraging, and may be conservatively estimated at 400.

AGRICULTURAL AND MECHANICAL COLLEGE.

The past year has been one of prosperity and expansion for the agricultural and mechanical college at Stillwater. Two hundred and nineteen students were enrolled, 95 of whom were in the collegiate classes, the remainder pursuing preparatory or review work in the preparatory department. A class of 8 members graduated, making a total of 24 young men and women now holding the degree of bachelor of science from this institution. The mechanical department has been installed in a substantial building erected for that purpose, containing a machine shop, blacksmith shop, woodworking shop, electrical department, drawing-room, and lecture room. Appliances to the value of $10,000 have been purchased and installed for this department. A printing plant has been purchased and occupies quarters in the mechanical building. Instruction is given in printing, a college paper is issued monthly by the students, and the college and station job work is done by the college press.

Special courses have been offered during the past year in stenography and typewriting. The department is supplied with a complement of typewriters and other appliances, and is in charge of a competent instructor. A department of music has been established and two pianos purchased.

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE, STILLWATER.

Regular instruction is given in sight reading and chorus singing, as well as private lessons upon the piano, and in voice culture.

By reason of the increasing resources of the college, the courses of study have been materially strengthened and enlarged. The college now offers six courses, as follows: (1) General science and literature course; (2) mechanical engineering course (including electrical engineering); (3) agricultural course (including horticulture); (4) special science course, with chemistry as major; (5) special science course, with biology as major; (6) special science course, with botany as major. Each of these courses covers four years and leads to the degree of bachelor of science. Students of mature years may elect special work under the direction of the faculty.

By reason of the increased appropriations for the benefit of the college by the last legislative assembly, it has been possible to add an approved course in the Latin and German languages to the curriculum of studies.

As indicated above, the resources of the institution have been largely increased. The college and station receive from the Government annually $37,500. The last legislature provided for the annual levy of one-tenth of a mill on the taxable property of the Territory, and also set apart one-fifth of the income derived from the rental of lands reserved to the Territory for the benefit of the institutions of higher learning. These two items will realize probably $9,000 per year for the present. Other sources of income raise the annual resources of the college to about $50,000 a year. The last legislature also appropriated $20,000 for building purposes. This, in connection with other available funds, is now being expended in the construction of two handsome and commodious buildings, one to accommodate the department of chemistry, the other the library and the several departments of biology. The appliances in the departments of chemistry and biology, consisting of laboratory material, models, charts, microscopes, balances, collections, etc., represent the outlay by the Government of many thousands of dollars, and the new quarters now being provided will incalculably increase their effectiveness in instruction and experimentation.

The library now contains 5,000 volumes, and immediately upon the completion of the new library building will be greatly enlarged.

A large dormitory and clubhouse is being erected by private enterprise, and will be in operation at the beginning of the fall term, September 11, 1899. It will accommodate about 50 students.

The faculty consists of 17 members, including assistants and instructors, and in the most gratifying degree it is harmonious and enthusiastic in the work of developing the college. Every member is a teacher of recognized ability and standing.

Altogether the outlook is exceptionally encouraging. The number of inquiries from prospective students is at this writing entirely unprecedented, and a largely increased attendance is confidently expected.

According to statistics issued by the Department of Agriculture at Washington, there were, in 1898, seven State agricultural colleges that had a smaller number of students enrolled than this college.

The average age of all our students at the beginning of the fall term was 19 years; of college students 19.4 and of preparatory students 18.6 years. Eight per cent of those enrolled were 14 years of age, 11 per cent 15, 12 per cent 16, 17 per cent 17, 15 per cent 18, 11 per cent 19, and 27 per cent 20 and over. With higher average age

comes greater maturity of thought and possibilities for more and better work, which have been manifested in the results of the year.

With the enlarged space and greater facilities which the new buildings will afford, next year should bring at least 200 students into the regular four years college courses.

NORTHWESTERN TERRITORIAL NORMAL SCHOOL.

The founding of this school is due to an act passed by the legislative assembly in 1897. This act provided that the school should be under the control of the board of education already in charge of the first normal school located at Edmond. This board took the first formal steps looking toward the organization of the school August 28, 1897, when the president and two assistants were elected and instructed to open the school in the rooms of the Alva Congregational Church, which building was put at the disposal of the Territory by the people of Alva, till such time as permanent quarters for the institution could be provided by the Territory.

March 10, 1898, the board contracted with John Volk & Co., of Rock Island, Ill., for the erection of a building upon the 40-acre campus just to the south of this city, which has been donated to the Territory. The consideration was $86,018. Besides simply the building the contract called for a complete gas plant and all piping, chandeliers, and brackets; 500-barrel tanks in the attics, with all necessary piping for drinking, scientific, and fire-protection purposes, venetian blinds to every window; stages with curtains and complete paraphernalia for the two society halls; the putting in of complete chemical lockers and dissection tables with all plumbing, and 60 feet of glass door cases for scientific apparatus; a 600-barrel cistern; 14 hand lavatories, and pasteur filters with 5 drinking stations; the installation of B. F. Sturtevant's complete fan system of heating and ventilating the entire building, every room to be controlled by Power's Automatic Regulator; the erection of an outhouse 12 by 40 feet and the laying of permanent walks from the main entrance to the campus to the building and from the building to the outhouses. The betterment of the building here and there and some extras, all spread upon the minutes of the board, brought the price of the completed structure to $91,994.92.

The building was finished and the keys turned over by the contractor to the board of education April 5, 1899, its completion having required a little more than one year.

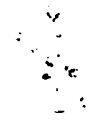
Perhaps 12,000 people have visited this building during its construction and since its completion. It is pronounced by all to be one of the most perfect normal school buildings in the United States.

The building is in form of an H, the extreme length is 157 feet, the extreme depth 122 feet; the central part is three stories, the wings two stories; there are 34 rooms all told.

The progress of the school has been constant and rapid. The first normal school founded in the United States was at Lexington, Mass., in 1839, with only 3 students. The first normal school in Illinois opened at Bloomington, in 1857, with 27 pupils. The Northwestern opened at Alva September 20, 1897, with 54 students. The enrollment grew that year to 156.

The second year the school was given the Baptist church in addition to the Congregational, and an extra teacher. The enrollment reached 211, a gain of 27 per cent over the first year. The enrollment has

NORTHWESTERN NORMAL SCHOOL, ALVA.



been limited to our capacity, 73 applicants being turned away during the year for lack of room.

The teachers here have been well pleased with the character of the students. They have been almost without exception of a high order of intelligence and they have carried into their work unusual earnestness.

The families of these students represented the following occupations:

Farmers	81	Cattlemen	66
Mechanics	17	Laborers	11
Attorneys	8	Merchants	7
Clerks	5	Physicians	3
Ministers	2	Engineers	2
Postmasters	2	United States land office	2
Sheriffs	2	Real estate	1
Railroad employee	1	Banker	1

The average age of students during the past year was 18 years and 8 months. The school will begin work in the new building September 11, and the coming year will find its enrollment from 350 to 400. In view of this fact the board at their last meeting appropriated $10,000 for the furnishing and equipping of the building, and employed a full faculty of instructors. The faculty of the institution is a most excellent one. Nearly all the teachers are specialists; some of them are eminent in their line of work. They embrace various religious beliefs and sustain various political relations, thus illustrating the purpose of the management to make the school entirely acceptable to all the people. Few institutions are guided by a faculty embracing more direct normal-school experience. The Michigan, the Illinois, the Iowa, and the Kansas State normals are represented by this faculty, and most of them have taken university courses.

The purpose of this school is the preparation of teachers for the schools of Oklahoma. All its energies are centered in this. Its proudest aspiration is to make its diplomas mean that the bearer is a competent and safe teacher of the young.

LANGSTON UNIVERSITY.

By an act of the fourth legislative assembly of Oklahoma this university was established for the education of the colored people of the Territory. It is located at Langston, Logan County, and sustains the same relation to the colored people of the Territory that the normal schools, the Agricultural and Mechanical College, and the University of Oklahoma sustain to the white people. It is governed by a board of regents, consisting of the Territorial superintendent of public instruction, the Territorial treasurer, and three other persons, who are appointed by the governor and confirmed by the council of the legislative assembly. The present site was selected by the regents and was purchased and presented to them by the citizens of Langston. The university building was erected at a cost of $5,500, and was equipped with furniture at a cost of $1,000.

The university was opened on the 14th of September, 1898, with 4 professors and 41 students. The sessions were held until October in the public school building and the churches, as the university building was not completed until that time. At the close of the year the enrollment was 181 students and 39 model school pupils. The average age of the students was 18. At least 75 per cent were from the farms of Oklahoma, and 50 per cent worked their way through during the year. From the beginning of the year to its close interest in higher

education steadily increased. Many of the students who entered with the view of remaining for a few months have decided to return next year and continue until they are properly prepared for the work of life.

Early in the session of the fifth legislative assembly a committee was appointed to visit Langston University and report its condition and needs. So favorable was the impression which was made upon this committee by the teachers and students that all of its members took a decided stand in favor of a liberal appropriation. As a result the legislature granted $44,000 for the next two years, $10,000 of which was given for building purposes. With this money the regents have already erected a substantial two-story stone building to be used by the mechanical department and have begun the erection of a commodious frame building to be used as a dormitory for young women. This building also will be two stories in height, and will contain 40 rooms. The regents have employed three additional teachers whose duty it will be to give instruction in the departments of natural science, agriculture, and mechanic arts.

In view of the success of this institution during the past year, and the increased facilities made possible by the action of the legislature, it is expected that the attendance next year will be considerably over 200. The interest of the university is confined to no locality. It is general. The colored people in all parts of the Territory are proud of their university, and are making many sacrifices in order that their children may be able to enjoy its benefits.

In the establishment of this school and making provisions for its maintenance during the present year the legislative assembly directed that $15,000 of the accumulated Morrill fund in the hands of the original Agricultural and Mechanical College at Stillwater might be transferred to this school for the use and benefit of colored people who would hereafter be excluded from Stillwater College, but the Interior Department declines to approve of such transfer because under the terms of the first agreement between the Territory and the Government said funds were to be used for the Stillwater College only. It seems to me, now that the colored race is to be excluded from further participation in the Stillwater school, and are provided with a separate school, the funds on hand might be equitably divided as provided by the legislative assembly, and I respectfully urge that you will ask Congress to remedy the apparent difficulty by the passage of an act approving and ratifying the act of the legislative assembly above referred to.

OTHER SCHOOLS AND COLLEGES.

In addition to the public schools and higher institutions of learning conducted by the Territory there are a number of sectarian and private schools in the Territory, some of which are well-established institutions with a large attendance.

The oldest of these is the Sacred Heart College, located at Sacred Heart Mission, in Pottawatomie County. This mission and school was established by the Catholic Church twenty-three years ago, and for a number of years was devoted exclusively to the education and conversion of Indians. After the settlement of the Territory white pupils were admitted, and during the past year the school has been devoted wholly to white scholars, 55 boys having been in attendance. The reverend fathers who have built up this school started it in the wilderness at a time when there was danger all about, and have

SACRED HEART COLLEGE.

braved many hardships in keeping up their noble work. Congress has granted them a special grant of land, and the institution bids to long continue an important factor in the educational work of the Territory.

The Catholics also have a college for girls at Guthrie, a fine institution, doing good work, and will build a school at Oklahoma City. They have an academy for negro children at Guthrie and several fine schools in the Osage Reservation.

The Congregational College at Kingfisher is a flourishing institution lately housed in a good building and doing excellent work. A $5,000 dormitory is in course of erection.

The Friends have an academy at Stella, Woods County, and schools at several other points. Good business colleges flourish at Guthrie, Oklahoma City, and Shawnee, and the Methodists, Presbyterians, Congregationalists, and Episcopalians have mission schools among the Indian tribes in the southwest.

The Baptists are about to locate a college in the Territory; the Methodists have resolved to build a hall in connection with the Territorial University, and a college building will be erected at Blackwell the coming year.

INDIAN EDUCATION.

In addition to the excellent common-school system of the Territory and the flourishing higher institutions of learning, the Government conducts a most excellent system of schools on the Indian reservations as well as a large institute and industrial school, in which every Indian child in the Territory is being educated, whether willing or not. The Chillocco Industrial School is located in Kay County, and is one of the finest institutions of the kind in the nation. It has magnificent buildings, equipped with every facility and appliance and manned by a most excellent corps of instructors.

In a recent communication C. W. Goodman, the superintendent of the school, gives the following interesting facts regarding the school and its work:

Chillocco school is located on the Chillocco Reserve, just south of the Kansas State line and 7 miles from Arkansas City. The school farm contains 8,640 acres, about 560 of which are under cultivation, 60 of which have been broken this year.

The Santa Fe Railroad passes through the reserve some 2 miles from the school, at which point there is a flag station. The new line of the Frisco to Blackwell also passes through the farm, about a mile from the school, where there is also a flag station.

The principal buildings—viz, girls' home, school building and chapel, boys' home, dining hall, kitchen and laundry, workshop, cattle shed, and hospital—are all of stone, while five cottages, the office, a horse and cattle barn, tool house, and granaries are of frame. The improvements cost about $150,000.

During the past year there were enrolled 414 pupils (253 male, 161 female), representing 28 tribes. The average attendance for the school year was 333.50, both the enrollment and the average being somewhat larger than that of the previous year. The largest average for one month was 365.10 for February.

During the year there has been erected a granary costing $500, while there is in course of construction and to be ready for use October 1 a new stone boys' dormitory, 40 by 60, which is to cost about $8,500. This new building will increase our present capacity from 300 to 400, which number can be easily accommodated.

During the coming year it is hoped to have added a superintendent's residence, a new office, and an electric-light plant. The new buildings will be of stone, a quarry on the farm furnishing the material.

Conditions would seem to indicate a prospect for a yet more successful year in the one just opened than in the one past, and we anticipate all the pupils in attendance we can comfortably accommodate.

In addition to this institution the Government maintains 14 reservation boarding schools and 2 day schools for the Indians of the Territory, as follows:

School.	Number in attendance.	School.	Number in attendance.
BOARDING SCHOOLS.		BOARDING SCHOOLS—continued.	
Absentee Shawnee	75	Red Moon	75
Arapahoe	130	Riverside	100
Cheyenne	200	Sac and Fox	120
Fort Sill	125	Seger	120
Kaw	60		
Osage	180	DAY SCHOOLS.	
Otoe	75	Kiowa	30
Pawnee	125	Whirlwind	20
Ponca	100		
Rainy Mountain	50	Total attendance	1,575

Nine school districts in the Territory have accepted the Government's offer to pay for schooling Indian children in the common schools; the aggregate attendance being 74 Indian pupils.

The Government pays the districts taking Indian scholars $10 per capita per quarter on the average attendance of Indian pupils, a rate which is highly remunerative and should induce many districts to test the value and practicability of this proposed plan of coeducation of the races.

SCHOOL LAND.

The school lands of Oklahoma are the Territory's most valuable heritage, and the leasing and looking after these lands, collecting rentals, and distributing the net proceeds to the schools and school districts is the most important department of Territorial business.

By the act of Congress approved March 4, 1889, opening Oklahoma to settlement, sections 16 and 36 in each township were reserved for the use and benefit of the common schools, and said reservation was confirmed by the organic act of the Territory. By act of Congress approved March 3, 1891, authority was given the governor to lease said lands for the benefit of the school fund under such rules and regulations as might be prescribed by the Secretary of the Interior.

By the act of Congress approved March 3, 1893, the President was empowered to make reservations of lands in the Cherokee Outlet for such public purposes as he might deem wise and desirable, and in accordance therewith, by executive proclamation opening the Cherokee Outlet to settlement, the President reserved section 13 in each township for the benefit of higher educational institutions, and section 33 in each township for public buildings, which reservations were subsequently ratified by the act of Congress approved May 4, 1894.

By the act of Congress approved May 4, 1894, a board for leasing school lands was created, composed of the governor, secretary of the Territory, and superintendent of public instruction, who were authorized to lease the lands under the rules and regulations prescribed by the Secretary of the Interior until laws for the administration of the trust should be enacted by the legislature of the Territory.

By the act of Congress approved June 18, 1897, the lands in Greer County were opened to homestead entry, and sections 16 and 36 in each township were reserved for common-school purposes, and sections

13 and 33 in each township were reserved for "such purposes as the legislature of the future State of Oklahoma may prescribe."

The third legislative assembly failed to pass any law governing the leasing of school lands, but adopted a joint resolution authorizing the board as constituted by Congress to continue the leasing of lands, and permitted the board in the leasing of western lands to lease the same in such quantities as they might deem best for the public interests.

The fourth legislative assembly passed an act to regulate the leasing of school lands, which was vetoed by Governor Renfrow.

The fifth legislative assembly in its last hours passed an act to regulate the leasing of school lands. This act was comparatively an adequate measure when introduced, but in its passage through the two branches of the assembly was hacked out of all resemblance to the original bill. Upon reading the perfected measure I felt at once it was a dangerous one and detrimental to the best interests both of the Territory and those who were leasing the school lands. Letters from the president of the Territorial School Land Lessees' Association and from the secretary of the Oklahoma Live Stock Association, whose members lease many thousands of acres of school lands, and from many private citizens and lessees confirmed me still further in this belief, and I determined it to be my duty to veto the bill. My objections to the bill are stated as follows:

Hon. J. P. GANDY,
Chairman Committee on Public Lands in the Council, and
Hon. W. H. MERTEN,
Chairman Committee on Public Lands in the House.

GENTLEMEN: I have had under careful consideration House bill No. 26, entitled "An act to create a Territorial land office and a commissioner thereof, etc." and find the same so full of incongruities and inconsistencies, so short of creating a good system of administration and control of our public lands, so lacking in the necessary provisions to safeguard the funds arising from leases of said lands, and so generally unsatisfactory that I have determined to withhold my signature from the bill.

I would be most happy to have signed a bill for the establishment of a good Territorial system of management of those lands and funds, and such a bill, I am informed, was perfected after some weeks of careful study and investigation of the various important questions involved, by your committee acting jointly, a bill which met the approval of the secretary of the school land board and the president of the lessees association, but the house and council in the hurry and meager consideration given this measure so mutilated it with amendments that the bill as passed bears no resemblance to the bill as perfected after so much careful labor by your committee, acting jointly.

I have been informed by some of the members of both houses that voted for this bill that they did so reluctantly, and advised by them that it would be better to try again two years hence than to sign this one. I have also letters from prominent gentlemen in all parts of the Territory, including the secretary of the cattlemen's association and the president of the school land lessees' association requesting me not to sign the bill.

I have felt it my duty to yourselves and others to give the reasons which actuate me in this matter as above stated, to which I will add a few notes in regard to the provisions of the bill for your information and that of the people interested.

Section 23 denies to nonresidents the right to re-lease school land. Many citizens of other States are already lessees. This is a practical confiscation of the property and a denial of the Constitutional right, that citizens of "each State shall be entitled to all the privileges and immunities of citizens in the several States."

No provision whatever is made for the payment of the sum of $1,568 demanded by the Commissioner of the General Land Office for the fees of registers and receivers of the United States land offices for the selections of indemnity lands in the Guthrie, Woodward, and Oklahoma land districts, which is now pending on appeal before the Secretary of the Interior, and if the Secretary of the Interior

affirms the decision these selections would be subject to cancellation. The Territory has already paid an agent over $12,000 to make the selections. The secretary of the school land board, on page 4 of his report, called the attention of the legislature to the fact that this suit was pending before the Interior Department, and the governor, in his message, urged legislative action to secure remission of these charges.

Sections 1 and 2 creating a board of trustees, nonpartisan in politics, does not fix any salaries for board, but by implication allows them to fix their own salaries. and does not limit the length of time they shall sit.

Sections 10 and 11 are too severe in their provisions. Instead of declaring an absolute forfeiture at the expiration of lease when lessee is in default, the commissioner should be vested with discretionary power to require additional security and to extend time in cases where worthy delinquent lessees are unable to meet their obligations. These sections would confiscate the improvements on school land and by requiring immediate sale would cause great sacrifice in the value thereof.

Sections 15 and 17 fix two different dates requiring lessee to apply for the renewal of his lease, making a failure to apply to renew at a given time a forfeiture of all rights. This is too drastic, and discretion should be vested in the commissioner or board that could give the lessee relief. Many of the lessees are not lawyers or business men and not familiar with the rules and never would be, and the enforcement of this law would deprive them of the right to re-lease, which right in itself possesses a pecuniary value.

Section 18 requires all vacant lands to be advertised for thirty days in a newspaper in each county, entailing a needless expense. Vacant lists are kept in the office and are sent on application. The lists are changed so frequently that an advertisement showing the vacant lands would be misleading.

By sections 5 and 19 the commissioner is required to give a bond of $50,000, and the maximum amount of money that is permitted to come into his hands is $500. As the office receipts often exceed $5,000 daily and the day's business can not be checked until evening, it would be necessary to violate the law every day or employ two additional bookkeepers, for which no provision is made.

Very respectfully,

C. M. BARNES, *Governor.*

OKLAHOMA, OKLA., *March 11, 1899.*

DEAR SIR: I have watched the progress of the school-land bill through the fifth legislative assembly with a deep interest, and I can not tell you how disappointed I am with the results. The bill as finally passed is the result of a series of compromises between the house and the council, and finally resulted in both parties taking what they could get.

It entirely changes the present system with which the people have become acquainted, and it was the hope of the lessees that about the present system would be crystalized into a law. It puts the management in a board of trustees at a very great increased cost, and instead of giving that protection which the lessees had a right to expect, it makes some provisions that would, if strictly enforced, deprive or confiscate the property of some unfortunate lessee by compelling him to remove all his improvements and property that he had placed upon the tract of land or his growing crop planted thereon within thirty days from the expiration or cancellation of his lease.

The bill is so full of inconsistencies and doubtful provisions that it should not become a law, and I earnestly recommend and request your excellency to withhold your official signature and not permit the same to become a law, and I ask this on behalf of the 6,000 lessees of Oklahoma Territory.

E. H. FAHS,
President Lessees Association.

Hon. C. M. BARNES,
Governor of Oklahoma, Guthrie, Okla.

WOODWARD, OKLA., *March 11, 1899.*

DEAR SIR: By instructions of the executive committee of the Oklahoma Live Stock Association, as secretary of the same, I have carefully observed the provisions of the bill for leasing school lands passed by the legislature, and, in my opinion, its provisions are detrimental to the interests of the members of our

association residing in the Territory of Oklahoma. The necessity for an even valuation for all sections in that part of Oklahoma lying west of range 14, which is now by law constituted the free-range district, is apparent to anyone who is familiar with the methods of handling cattle in part or in whole upon borrowed capital. These loans are of short term and must frequently be renewed by reason of sale of cattle, shipments, or taking up of paper from any cause whatever. In each case where the valuation of sections is not evenly made the loan company would require a personal inspection of said pastures to determine the security of the paper handled. This would result in increased expense to the borrower, and, in some instances, where several transfers would be made in one year, would be prohibitive of profit and thereby deprive the cattlemen of the opportunity of grazing, as well as result to the disadvantage of the rentals of the school lands.

There are other reasons why this measure will be detrimental to the interests of western Oklahoma, but the foregoing alone is sufficient reason to ask your disapproval of the measure.

Respectfully, yours, W. E. BOLTON.

Hon. C. M. BARNES,
Governor, Guthrie, Okla.

The legislative assembly having again failed to perfect a suitable measure for the care and control of school lands and funds, I deemed it expedient, after an experience of two years, to make some changes in the rules and regulations of the board, and upon conference the following rules were unanimously agreed to by the board and are now in force and effect, viz:

Rules and regulations of the board for leasing school land.

RULE 1. The governor of the Territory shall be chairman of the board, and when absent the secretary of the Territory shall act as chairman; the board shall hold regular meetings on the first Tuesday of each month, and the chairman may call meetings whenever the business of the office requires, or at the request of two members.

RULE 2. Two members of the board shall constitute a quorum to do business.

RULE 3. The board shall appoint a secretary who shall qualify by taking the usual oath of office and give bond in the sum of $25,000, to be approved by the board and filed with the secretary of the Territory, who shall record and safely keep the same. The secretary of the board shall receive as compensation for his services the sum of $2,500 per annum.

DUTIES OF THE SECRETARY.

(*a*) It shall be the duty of the secretary of the board to keep the minutes of all meetings of the board, and all books and papers pertaining to the leasing of land; to receive all moneys derived from leasing school, college, and public building lands, and to disburse the same as directed by the board; to receive and pass on all applications for land, and to make out proper leases and notes for the same, and to present the same to the board with his recommendation; to furnish lists of vacant lands to all applicants, to keep a full and complete record of all his official acts, and shall prepare and furnish to each member of the board, on the first day of each month, a complete statement of the condition of each of the funds under the control of the board, showing the balance as per previous statement, the receipts during the month, the amounts expended on order of the board, and the amount turned over to the Territorial treasurer for which he holds receipts, and the amount of any balance in his hands.

(*b*) The secretary shall appoint, by and with the advice and consent of the board, a special agent at a salary of $100 per month, an assistant at a salary of $85 per month, a bookkeeper at a salary of $75 per month, and a stenographer at a salary of $60 per month, who shall be subject to the immediate direction of the secretary.

(*c*) The secretary shall keep by sections, townships, and ranges tract books of all lands reserved for the use and benefit of common schools, colleges, and public buildings, showing date of acceptance of application, date of execution, delivery and expiration of lease, and number of cash payment receipts and registered numbers of all notes and payments thereof. He shall record and number consecutively all leases approved by the board, and shall record in series, according to

date of maturity and fund to which they belong, all notes given for deferred payments under said leases, and in like manner shall record and number, consecutively by series, all payments made on registered notes and post the same to the tract books and register of notes received. He shall keep a cash book in which he shall each day record all moneys received by him from whatever source, showing by whom paid and note or cash payment number. He shall also keep by series a record of all notes canceled on account of new notes taken in case of transfer of lease to another party, or which may by the board be ordered canceled for any other cause. He shall keep a record of all expenditures; he shall keep a copy of all letters received or mailed affecting the status of leases, and a complete record of all judgments rendered in the various courts of the Territory affecting school lands.

(*d*) He shall, unless otherwise directed, receive and accept or reject all applications for leases and give notice of his action to the applicant.

(*e*) He shall report to the board for cancellation of leases all delinquent lessees or those in any manner violating the essential condition of the leases.

(*f*) He shall notify each lessee upon the return of the appraisement of the land leased to him of the appraised rental value and the value of improvements, notice to be sent by mail to the recorded address of such lessee.

(*g*) He shall cause to be published in some newspaper in the county where leases are expiring a notice setting forth the date when applications for renewal will be received.

(*h*) It is made the duty of the secretary of the board to ascertain the amount of indemnity lands due the Territory for any cause, and under direction of the board to select land in lieu thereof whenever and wherever in the judgment of the board the best interests of the Territory shall be subserved, and he shall be allowed his actual expenses necessarily incurred when required to make trips to different parts of the Territory in the performance of his official duties.

(*i*) It is made the duty of the secretary to enforce the provisions of section 2 of chapter 24 of the Session Laws of 1895 relative to the condemning of school lands for private and corporate uses; to ascertain whether any school lands have been appropriated without complying with this law and to enforce compliance therewith in all cases.

(*j*) He shall do all other necessary work connected with the administration of the school-land office.

RULE 4. All expenses incurred in the leasing, management, and control of said lands shall be paid out of the funds derived from leasing the same. Itemized bills of all expenses excepting the fixed monthly charges of the office, which shall be paid on the last day of each month, shall be presented to the board for allowance before payment, and all expenses, unless incurred for the benefit of some particular fund, shall be equitably distributed between the several funds.

Separate accounts for all moneys received from lands reserved for common schools, colleges, and public buildings or other purposes, respectively, shall be kept and all moneys accruing to the fund for colleges and public buildings shall be turned over to the Territorial treasurer as provided by law, and the money for common schools shall be turned over to said treasurer on the first day of each month. All funds received from the leasing of any public lands shall be deposited in some bank or banks designated by the board in the name of the school-land board, and all disbursements shall be by checks drawn on said account signed by the secretary and countersigned by the chairman of the board.

RULE 5. Any person aggrieved by the action of the secretary in any cause may appeal to the board. All such appeals must be in writing, setting forth the ground of appeal in clear and concise language and must be filed with the secretary within twenty days after notice of the action appealed from, but the board may review the action of the secretary in any case on the request of any member of the board.

RULE 6. Any person over 21 years of age, or the head of a family, and not in any manner in default in fulfilling any contracts heretofore made for leasing school land, married women not the head of a family excepted, shall be qualified lessees.

RULE 7. All lands now subject to lease under the several acts of Congress heretofore passed and all lands which may hereafter become so subject, either by act of Congress or otherwise, shall be leased, in the first instance, for a term not exceeding three years, and upon the expiration of such leases may again be leased for a period not exceeding three years.

RULE 8. All leases will be renewed for a period of three years from date of expiration and the rent reserved therein shall become due and payable on the 1st day of October of each year. But in case of a transfer of a lease expiring on the 1st day of October in any year a cash payment of three months' rental at the rate

named in the lease will be required and a new lease, to expire on the 1st day of January following the October in which the old leases expire, will be issued.

The secretary is hereby directed to issue a regular cash-payment receipt for use and occupancy for the additional three months' rental collected.

RULE 9. Lessees in good standing will be permitted to renew their lease without cash payment in advance for the first year's rental, and will be permitted to give notes for the payments becoming due each year, which notes must have at least two sureties who are homesteaders or men of known responsibility.

Persons leasing vacant lands will be required to pay the first year's rental in advance and will be allowed to make notes for the two deferred payments in like manner as lessees renewing their leases.

RULE 10. The rental value of all lands that have been appraised shall be fixed by the appraisement herein provided for. On all lands lying west of range 14 west of the Indian meridian the minimum price shall be $16 per quarter section or $33 per section, except in Beaver County, where the minimum price shall be $10 per quarter section or $20 per section, and in Greer County the minimum price of $12.50 per quarter section or $33 per section.

In case any appraised lands have been duly offered for lease at any public leasing and no bids shall have been received, then, after thirty days, said lands may be leased for not less than two-thirds of the appraised value thereof, at the discretion of the secretary.

RULE 11. The amount of land lying east of range 14 west of the Indian meridian that may be leased to any one person shall be 160 acres, and in no case will less than a quarter section be leased to one person except where the quarter is fractional; west of said range line as many sections may be leased to one applicant as may be deemed to the best interests of the several funds for which said lands were reserved.

RULE 12. No person shall be permitted to cut any valuable timber on said land or quarry any stone or minerals therefrom except such as may be necessary for and actually used for improvements on said lands or for fuel to be used on the premises.

WARNING.

Complaints frequently reach the office that lessees are cutting saw logs and giving the mills one-half of the lumber in payment for sawing. This is a flagrant violation of the conditions of their contract, and the summary cancellation of leases will be made in cases where such charges are fully established.

RULE 13. No person will be permitted to assign or sublet any portion of the leased premises except in case of lands west of range 14 west by special agreement, to be embodied in the lease.

RULE 14. Any lessee may, upon payment of all rental due or to become due within sixty days, relinquish to the Territory all his rights, title, and interest in said lease upon condition that a new lease be granted to any responsible person named by the lessee, but such relinquishment shall not operate to discharge the lessee from any obligations under the lease nor relieve him or any joint principal or surety from payment of any notes given for rental of the land until the person named in the relinquishment shall have executed a lease for the unexpired term and made good and satisfactory notes for all deferred payments.

RULE 15. All persons desiring to have transfers made must present the relinquishment of the lessee and have the transfer made on the books of the school-land office within thirty days from the date of the execution of such relinquishment.

RULE 16. The secretary shall cause to be made a list of lands upon which leases are about to expire, and shall forthwith cause the same to be appraised, which appraisement shall be under oath of the appraiser or appraisers, and shall state the natural character of the land and the rental value thereof, and shall give a detailed statement of the improvements thereon by items, which appraisement shall be subject to review and revision by the board. Upon the return of such appraisement each lessee shall be notified of the appraised rental value of the tract leased to him and of the appraised value of the improvements, notice to be by mail to the recorded address of such lessee. If he has any objections to said appraisement or complaint to make, he must notify the board within twenty days, stating his objections and making his complaint under oath, supported by the affidavit of at least two reliable persons who know the land and the improvements thereon and the average cash rental of lands in the vicinity.

RULE 17. Public notice shall be given in some newspaper published in each county wherein leases are about to expire, which notice shall be at least thirty days before the expiration of such leases, and such public notice shall state when and how bids will be received for renewing leases, or for bidding on lands not

heretofore leased, and all lessees should take notice of such public notice and be prepared to send in their applications promptly.

RULE 18. The board shall fix the rent at a reasonable rate, neither excessive nor below the amount of the old lease, and give to the occupying lessee, provided he has cultivated the land in a husbandman-like manner and fulfilled the terms of his lease in good faith, and is not in default of any of his rental obligations, the preference right to re-lease the land for an additional term of three years at the rental fixed by the board by the appraisement. In the event the occupying lessee fails to avail himself of the noncompetitive preference right thus given him then the land shall be leased under rule 23.

RULE 19. Any lessee desiring to renew his lease for another term must make application on forms furnished by the school-land office on or before the day designated in the public notice for receiving applications on said lands, and in case the lessee fails to make his application, as herein provided, he shall be deemed to have waived his preference right and the secretary shall proceed to lease the same, if there are no improvements, as vacant land. If there are improvements, they shall be sold to the highest bidder as provided by rule 22 governing the sale of improvements.

RULE 20. Any lessee may, at the termination of his lease, remove any or all of his improvements, excepting improvements that were made from material obtained from the land, which shall be deemed to be a part of the land and shall revert to the Territory at the expiration of the lease and shall not be removed from the premises, and he shall have the right to enter thereon to harvest or remove any growing crop thereon at the expiration of his lease: *Provided, however*, That in case the lessee is in default for nonpayment of rent he shall not be allowed to remove such improvements or make such entry to secure crops until all arrearage of rent is fully paid: *And provided further*, That such improvements and growing crops shall be removed within sixty days after the termination of such lease, and not thereafter.

RULE 21. Upon the nonpayment of the rent on any land so leased when the same is due and payable, or upon the failure or refusal of the lessee to furnish additional surety for any deferred payments when requested to do so by the secretary, or if the lessee shall fail in any manner to comply with the conditions of his lease or violates any of the conditions thereof, the board may, at its option, declare such lease forfeited and the secretary of the board, or any person by him authorized, may take immediate possession thereof, together with all improvements thereon and relet the same as other vacant lands are leased.

RULE 22. The secretary may, at his discretion, sell to the highest bidder or at private sale all the improvements of any lessee who has abandoned the land leased by him, or who is in default on payments for rental due the Territory, and the money derived from such source shall be applied on the past due rental of such defaulting lessee, and any sum received by the secretary in excess of such past due rental shall be paid to such delinquent or defaulting lessee, or his legal heirs or representatives.

RULE 23. The secretary shall cause to be made a list of all vacant lands and lands, if any, upon which lessees have declined or failed to re-lease, giving the appraised value of each tract and the improvements, if any, thereon, and shall advertise the same at public leasing at a date not more than sixty days subsequent to the time fixed for lessees to apply to re-lease, and all such lands shall be leased to the highest bidder in each instance. The right to reject any or all bids under such leasing is hereby reserved.

RULE 24. In estimating the value of improvements on school, college, or public building lands, the improvements thereon shall be taken at their actual reasonable cash value, and for trees and breaking shall in no case exceed the following rate: For apple, peach, pears, plums, cherry, apricots, grape vines, and other fancy fruits, from 5 to 50 cents each. Breaking shall be estimated as follows: Upon the renewal of a lease all breaking done shall be estimated—for prairie breaking at from 50 cents to $1 per acre, and for grub-land breaking from $1 to $3 per acre. In case of transfer of lease the second tenant shall be accorded the same privileges as the original tenant would have had.

RULE 25. All persons are forbidden to enter upon and occupy or, in any manner, use for agricultural, grazing, or other purposes, or to remove any stone, hay, or timber from any school, college, public building, or indemnity lands, and all persons will take notice that all such trespass will be promptly prosecuted and the trespasser held liable in damages and punished as provided by law.

No preference will be given to any person who settled upon or made improvements on any of the above lands prior to receiving a lease therefor, and no protection whatever will be accorded to improvements placed thereon, but the same will be held as the property of the Territory.

Rule 26 defines the form of lease.

Up to this time the funds arising from leasing of public lands had always been in the custody of the governor until turned over to the Territorial treasurer for distribution. Under the new rules such funds are deposited in the name of the board, and upon closing my personal account as custodian I caused an examination of the same to be made by the Territorial board of education, which submitted the following report:

Hon. C. M. BARNES, *Governor.*

SIR: In compliance with your request of date May 13, 1899, to wit:

GUTHRIE, OKLA., *May 13, 1899.*

DEAR SIR: In view of the fact that I have had personal custody of the funds arising from the rentals of public lands in the Territory for schools and colleges and public buildings for the past two years, during which time I have had in custody large sums of money, amounting at times to over $100,000, and in view of the fact that under the new rules recently adopted by the board for leasing school lands I have been, at my own request, relieved to some extent of the personal responsibility and have closed my personal account, I deem it proper to request that you call a meeting of the Territorial board of education at an early date and request said board to make a careful examination of the books, cash accounts, and bank accounts pertaining to my custody of said funds, and make report to me of their finding in the premises.

Very respectfully,

C. M. BARNES, *Governor.*

Hon. S. N. HOPKINS,
Secretary Territorial Board of Education.

The undersigned members of the Territorial board of education of Oklahoma, have examined the footing of the several books in the school-land office, the treasurer's receipts and the books in the treasurer's office, and the bank books and canceled checks for moneys disbursed, and we find the total receipts of the school-land office from May 26, 1897, to May 1, 1899, to be $329,819.98, of which amount $23,115.93 was disbursed for expenses, $1,052.95 was returned to applicants, and the sum of $305,510.95 paid over to the Territorial treasurer, leaving $140.78 belonging to the funds of sections 13 and 33 in Greer County, which was checked to the account of the school-land board, who by the recently adopted rules are made the custodian of the school and public building funds.

From a full examination of the books of the school-land office, the bank books, and the canceled checks, we have ascertained the financial transactions of the office to be as follows:

Receipts and expenditures from May 26, 1897, to May 1, 1899.

Fund.	Receipts.	Expenses.	Money returned.	To treasurer.	On hand.	Total.
Common school	$239,369.16	$16,101.55	$816.45	$222,451.16	.....	$239,369.16
College	43,638.74	3,179.17	99.50	40,360.07	.....	43,638.74
Public building	44,000.33	3,171.07	137.00	40,692.26	.....	44,000.33
Greer County:						
Section 13	1,504.40	332.07	.....	1,118.44	$53.89	1,504.40
Section 33	1,307.35	332.07	.....	888.39	86.89	1,307.35
Total	329,819.98	23,115.93	1,052.95	305,510.32	140.78	329,819.98

The system of bookkeeping is well adapted to the business conduct of the office, and a monthly report is always made at the close of each month; and semi-annually, in July and January, a serial balance of the books is made which thoroughly tests the correctness of the monthly reports and proves the correctness of the footings on the books. The money was regularly deposited in the bank to the credit of the governor as agent, and the amounts necessary for expenses checked out by him. Every account and item of expense was paid by check, upon duly verified accounts sworn to, approved by the secretary and allowed by the board, and an examination of the bank books and every check drawn on these funds shows that at no time in a single instance was a dollar of these funds diverted to any private use, or used in any way except for the legitimate expense

of the department. The money was deposited as fast as received, and not a single check was ever drawn in favor of anybody except creditors of the department and the Territorial treasurer.

We further find on file in the office nineteen receipts from the treasurer of the Territory for money paid him by the governor on account of public school, college, and building funds, running in date from July 31, 1897, to May 1, 1899, and aggregating in amount $305,510.32, which amount agrees with the footings of the books of the bank as well as the books of the school-land office and the checks drawn in favor of the Territorial treasurer.

We note among these receipts one in the amount of $37,357.02, public building funds, dated March 7, 1899, the date of the signing of the bill requiring the turning over of this fund to the treasurer.

An examination of the books of the Territorial treasurer further discloses the amount of $1,818.53 paid into the treasury by the governor to await apportionment by the legislative assembly.

This amount is for interest allowed by the bank on daily balances as shown by their books and credited to the account of the governor, as agent, at regular intervals, no part of which has ever been diverted to his private or any other use, or withdrawn from the bank until checked out to the Territorial treasurer. There is no section of law requiring payment of interest on these deposits, or touching upon it in any way, and while it is a mooted proposition as to whether the interest legally belongs to the fund or the custodian, all question upon the subject seems to have been waived and the banks required to pay interest on daily balances, which, from the first, has been credited to the account of the governor, as agent, the same as have all deposits of public funds, and every cent turned over to the Territorial treasurer—the first record we find of any interest having been paid the Territory for deposit or use of school, college, or public-building funds.

Respectfully submitted.

DAVID R. BOYD,
President Territorial University.
EDMUND D. MURDAUGH,
President Territorial Normal School
B. F. NIHART,
Superintendent Oklahoma City Schools.
G. D. MOSS,
Superintendent Public Instruction for Kingfisher County.
S. N. HOPKINS,
Secretary, Territorial Superintendent of Public Instruction.

GUTHRIE, OKLA., *May 17, 1899.*

The business of the school-land department is large and constantly growing. It now transacts business directly with nearly 6,000 lessees in the collection of rental and the appraisement and transfer of lands. The correspondence of the office is very heavy, sometimes reaching several hundred letters in a day, and during the year over 2,000 leases have been made and recorded.

The department, through its special agent, has investigated every quarter of vacant land in the Territory outside of Greer County, and over $5,000 has been collected from persons using lands without leasing them, and leases have been made for all such lands, adding this sum annually to the school fund. During the year 500 quarter sections heretofore vacant were leased, principally in the western part of the Territory. Since the beginning of this administration 3,968 vacant quarter sections have been leased, increasing the receipts over $40,000 per annum. The notes becoming due in 1897 amounted to $108,113.35; in 1899, $155,936.77—an increase of $47,813.42. The Interior Department, having promptly approved the Greer County indemnity selections, has added $2,000 per annum to the various funds.

In 1897, when the present administration took charge of the school-land department, there was 4,159 sections of school land vacant, and though Greer County has been added, with 830 quarter sections, since then, there are but 292 quarter sections vacant in the entire Territory at this time.

Vacant school lands in 1897 and 1899.

County.	Quarter sections vacant.		County.	Quarter sections vacant.	
	1897.	1899.		1897.	1899.
Kickapoo Reservation	.....	12	Logan	18	2
Pawnee	61	.....	Canadian	22	2
Payne	31	.....	Blaine	148	48
Noble	36	.....	Kingfisher	49	6
Kay	24	.....	Dewey	204	12
Garfield	128	.....	Custer	207	.....
Grant	172	1	Washita	178	.....
Woods	763	43	Roger Mills	224	.....
Woodward	197	8	Day	169	2
Lincoln	181	1	Beaver	1,189	24
Pottawatomie	13	5	Greer *a*	.....	121
Cleveland	21	3			
Oklahoma	104	2	Total	4,139	292

a Greer County has been added to the Territory since 1897.

Receipts and expenditures for the year ending June 30, 1899.

On hand June 30, 1898	$55,072.92
Received from June 30, 1898, to June 30, 1899	145,151.83
Total	200,224.75
Expenses for the year	11,742.64
To treasurer	185,478.02
Returned to applicants	362.00
Balance on hand	2,642.09
Total	200,224.75

Receipts and expenditures of each fund for the year ending June 30, 1899.

COMMON SCHOOL.

Cash received		$107,437.44
Expenses	$8,206.18	
Returned to applicants	289.50	
Net proceeds	98,941.76	
		107,437.44

COLLEGE.

Cash received		18,189.57
Expenses	$1,458.77	
Returned to applicants	31.50	
Net proceeds	16,699.30	
		18,189.57

PUBLIC BUILDINGS.

Cash received		18,775.72
Expenses	$1,611.59	
Returned to applicants	41.00	
Net proceeds	17,123.13	
		18,775.72

GREER COUNTY.

Section 13:		
Cash received		464.75
Expenses	$233.05	
Net proceeds	231.70	
		464.75
Section 33:		
Cash received		284.35
Expenses	$233.05	
Net proceeds	51.30	
		284.35

Net proceeds from leasing lands.

Fiscal year ending June 30—	
1891	$4,536.83
1892	21,346.13
1893	19,164.67
1894	45,989.96
1895	88,627.97
1896	71,740.68
1897	98,467.81
1898	173,442.83
1899	133,047.19
Total	$656,364.08

The unusually large receipts for 1898 were caused by collection of a large amount of back rental.

Amount of distribution per capita each year.

Year ending June 30—	
1892	$0.83
1893	.56
1894	.72
1895	.69
1896	.62
1897	.86
1898	1.34
1899	.97

Notes on hand.

	Number.	Amount.
Common school fund	7,805	$266,406.38
College	1,391	47,040.07
Public building	1,283	43,179.31
Greer County:		
Section 13	97	2,894.35
Section 33	76	2,433.50
Total	10,652	$361,953.61

School fund apportionment to counties for 1899.

[97 cents per capita of school population.]

Counties.	Children of school age.	Apportionment, 1899.		Total.
		January.	July.	
Beaver	873	$707.13	$139.68	$846.81
Blaine	2,472	2,002.32	395.52	2,397.84
Canadian	4,408	3,570.48	705.28	2,275.76
Cleveland	5,774	4,676.94	923.84	5,600.78
Custer	2,183	1,768.23	349.28	2,117.51
Day	364	294.84	58.24	853.08
Dewey	1,444	1,169.64	231.04	1,400.68
Garfield	5,266	4,265.46	842.56	5,108.02
Grant	4,806	3,894.48	769.28	4,663.76
Greer	3,628	2,938.68	580.48	3,519.16
Kay	5,733	4,643.73	917.48	5,561.01
Kingfisher	5,720	4,633.20	915.20	5,548.40
Lincoln	7,800	6,318.00	1,248.00	7,566.00
Logan	7,188	5,822.22	1,150.08	6,972.30
Noble	2,991	2,422.71	478.56	2,901.27
Oklahoma	6,920	5,605.20	1,107.20	6,712.40
Pawnee	4,002	3,241.62	640.32	3,881.94
Payne	6,065	4,912.65	970.40	5,883.05
Pottawatomie	8,636	6,995.16	1,381.76	8,376.92
Roger Mills	886	717.66	141.76	859.42
Washita	3,584	2,903.04	573.44	3,476.48
Woods	9,220	7,468.20	1,475.20	8,943.40
Woodward	1,509	1,222.29	241.44	1,463.73
Total	101,474	$82,193.88	$16,235.84	$98,429.72

SOCIAL AND RELIGIOUS.

Peopled with the most enterprising people from all of the States of the Union, there is no reason to believe that the social condition of Oklahoma should be different from those of the States of which all the people have lately been residents, and yet there seems to be a widespread conception throughout the East that Oklahomans are a kind of strange beings, different from the general run of mankind, and at national conventions and assemblies of all kinds the delegates from Oklahoma are gazed upon with great curiosity, and often there seems to be disappointment over the fact that they are but ordinary men and women.

With a code of laws the equal of any State and enforced better than in many, with as small a per cent of illiteracy as any portion of the nation, with their magnificent higher educational institutions, with a schoolhouse on every hilltop, and a church in the valley, why should not the social and religious life of the people of Oklahoma be on as high a plane as in any State of the Union?

All of the leading religious denominations have representatives in the Territory and are doing progressive work; young people's religious societies and Sunday schools are found everywhere, and the reports of their work create surprise and enthusiasm in every national gathering. All of the fraternal bodies have good membership, every community has its newspaper, the Chautauqua society, literary circle, and musical or reading clubs are to be found in every town; a score or more of women's clubs compose an active Territorial federation; public libraries and reading rooms are found in the leading towns; the towns have more church buildings to the population than the majority of the States; the people meet in social functions of all kinds as do the people of the communities from where they came, and the visitor from any part of the United States will find here the social life, the educational advantages, and the religious opportunities to which he or she has been accustomed.

I give below the statistics of the leading religious and fraternal organizations of the Territory:

Methodist Episcopal Church.

Church buildings	102
Value of church buildings	$86,455
Parsonages	33
Value of parsonages	$11,850
Members	7,855

Episcopal Church.

Organized missions	15
Other regular stations	11
Church buildings	10
Parsonages	8
Clergy	8
Communicants	402
Value of church property	$20,000
Chapter St. Andrew's Brotherhood	1
Daughters of the King	1
Children in Sunday school	223

Christian Church.

Number of organizations	99
Membership	7,100
Church buildings	41

Value of buildings	$50,000
Preachers	98
Colored preachers	3
Colored churches	3
Young people's societies Christian Endeavor	31
Sunday schools	45
C. W. B. M. organizations	7

Congregational Church.

Number of organizations	82
Membership	2,557
Church buildings	60
Value of church property	$50,000
Preachers	49
Colored churches	2
Young people's societies Christian Endeavor	22
Membership young peoples' societies Christian Endeavor	644
Sunday schools	87
Membership	5,010
Grants to build churches since 1889	$22,500
Expended by Home Missionary Society	$80,000

Presbyterian Church.

Church organizations	44
Church membership	1,600
Church buildings	33
Value of church property	$57,000
Colored churches	2
Young people's society Christian Endeavor	20
Sunday schools	45
Sunday school missionaries	4

Baptist Church.

Churches:	
White	185
Colored	85
Membership:	
White	5,388
Colored	3,600
Ministers:	
White	80
Colored	100
Membership, Sunday school	8,000

Methodist Episcopal Church, South.

Charges	89
Societies or churches	115
Presiding elders	2
Pastors	89
Local preachers	88
Church members	3,936
Additions during year	1,001
Renewals during year	311
Church buildings (value, $36,080)	30
Parsonages (value, $9,454)	23
Epworth leagues	12
Membership	314
Sunday schools	47
Officers and teachers	282
Scholars	2,070

Roman Catholic Church.

Bishop	1
Priests	12
Churches	36
Chapels	6

Stations visited	100
Membership	13,000
New residences for priests	11
Academies	4
College for boys	1
Schools for boys and girls	5
Schools for colored	8
Convents	4
Monastery	1
Value of school and church property	$95,000

Friends.

Total white membership	900
Indian members	150
Indian missions	6
Indian schools	1

United Brethren.

Churches	8
Membership	300

Methodist Protestant.

Preachers	12
Members	250

Sunday schools.

Schools	850
Officers and teachers	6,000
Scholars	40,000
Per cent of population attending Sunday schools	12
Per cent of children attending Sunday schools	28

Young People's Societies of Christian Endeavor.

Young people's societies	129
Members	6,450
Junior societies	27
Members	850
Total societies	156
Total membership	7,300
New societies	33
Associate members uniting with the church during the year	280
Money given by the societies for missions and church expenses	$2,250

Colored churches.

	Membership.
Missionary Baptist	7,841
A. M. E. Church	1,286
C. M. E. Church	489
M. E. Church (colored wing)	436

Fraternal organizations.

Name.	Organizations.	New organizations.	Members.	New members.	Value of property.
Masons	43	8	1,895	431	$20,000
Odd Fellows	62	5	2,500	500	20,944
A. O. U. W	42	9	1,511	828	.....
K. of P	28	5	1,285	283	12,000
W. of W	48	10	1,163	704	.....
G. A. R	60	.....	1,500	.....	.....
Confederate Veterans	20	.....	700	100	.....
Maccabees	2	.....	.....	.....	.....
Eastern Star	5	.....	.....	.....	.....
Sons of Herman	10	.....	.....	.....	.....
Daughters of Rebekah	25	.....	.....	.....	.....

ILLITERACY.

Illiterate population 10 years of age and over, by States and Territories, 1890.

State or Territory.	Per cent.	State or Territory.	Per cent.
Maine	5.46	Missouri	9.09
New Hampshire	6.81	North Dakota	5.96
Vermont	6.69	South Dakota	4.22
Massachusetts	6.22	Nebraska	3.11
Rhode Island	9.76	Kansas	3.99
Connecticut	5.28	Kentucky	21.65
New York	5.53	Tennessee	26.64
New Jersey	6.50	Alabama	41
Pennsylvania	6.78	Mississippi	39.96
Delaware	14.31	Louisiana	45.53
Maryland	15.70	Texas	19.74
District of Columbia	13.20	Oklahoma	5.37
Virginia	30.18	Arkansas	26.65
West Virginia	14.41	Montana	5.46
North Carolina	35.71	Wyoming	3.41
South Carolina	44.95	Colorado	5.24
Georgia	39.83	New Mexico	44.49
Florida	27.79	Arizona	23.41
Ohio	5.24	Utah	5.59
Indiana	6.32	Nevada	12.81
Illinois	5.25	Idaho	5.14
Michigan	5.92	Washington	4.27
Wisconsin	5.73	Oregon	4.13
Minnesota	6.03	California	7.67
Iowa	3.61		

From this table it will be seen that Oklahoma in the first year of her existence had a smaller per cent of illiteracy than 35 States and Territories. With the high character of the subsequent immigration to the Territory and the maintenance of so complete a public-school system and of such excellent higher institutions of learning, it is reasonably certain that Oklahoma stands very close to the head, if not the first, on the list for the smallest per cent of illiteracy of any State or Territory in the Union.

DEAF MUTES.

The deaf mutes of the Territory are cared for and educated under a contract between the Territory and H. C. Beamer, under which the Territory pays $275 each per annum. The cost to the Territory for the year was $6,181.73, there being 27 in attendance at the institute throughout the year, and a part of the year 28. These scholars are from the following counties:

Logan	5
Payne	7
Canadian	3
Kingfisher	1
Pottawatomie	4
Lincoln	1
Oklahoma	2
Roger Mills	1
Noble	2
Kay	1
Total	27

The institute is located in Guthrie, being opened last year in a substantial frame structure pleasantly located. In preparation for the coming year, when the attendance is expected to be much larger, three

DEAF AND DUMB INSTITUTE, GUTHRIE.

additional schoolrooms have been added to the main building, an annex for the teachers and a large boys' dormitory built, with bathrooms in connection, all of which adds greatly to the facilities of the institution.

The improved interior and exterior of the institution, and the exceptional good health that has prevailed among the children gathered together there, are sufficient proof of the assertion that the expenditures during the year have been judiciously made. The schoolrooms are well ventilated and in keeping with correct sanitary regulations; the sleeping apartments are kept in excellent condition, well ventilated, clean, and all that good sanitary regulations require.

A corps of excellent teachers are employed in the institution and their work ably supplemented by the superintendent and matron. The work and progress accomplished during last term have been a surprise even to the parents and guardians themselves. The girls and boys accomplish a vast amount of work, and are preparing themselves for profitable employment in after life.

There are about 60 deaf mutes of school age in the Territory. The reports of the county clerks, which are somewhat incomplete, show the deaf mutes in the Territory as follows, by counties:

Deaf mutes in the Territory.

Beaver	2	Noble	7
Blaine	2	Pawnee	3
Cleveland	4	Payne	8
Dewey	1	Roger Mills	2
Garfield	5	Washita	1
Grant	7	Woods	8
Greer	5		
Lincoln	6	Total	71
Logan	10		

THE BLIND.

In the fall of 1890, under authority of an act of the legislature, I contracted with H. C. Beamer, of Guthrie, for the care and education of the blind, but owing to the small number of persons to be cared for he soon relinquished his contract, and I later made a contract with Charles Cunningham, which contract was again relinquished and canceled for same reason. No contract is now in force for the care of this class of unfortunates. The number of blind persons in the Territory as reported by the county clerks, is as follows:

Blaine	4	Oklahoma	7
Cleveland	2	Pawnee	1
Custer	1	Payne	3
Dewey	1	Pottawatomie	1
Garfield	4	Roger Mills	4
Grant	3	Washita	2
Greer	5	Woods	6
Lincoln	2		
Logan	2	Total	49
Noble	1		

INSANE.

Under authority of an act of the legislature Governor Renfrow entered into contract with the Oklahoma Sanitarium Company, a private corporation, for the care and treatment of the insane for a period

of three years from the 15th day of June, 1895, at a compensation of $300 per annum each. Under this contract said company established an institution at Norman, providing a good brick building, furnished with necessary conveniences and modern accommodations and equipment for the purpose designed.

The fourth legislative assembly provided (Session Laws, 1897, chap. 16) for a new contract after the 15th day of June, 1898, under the authority of which I made a contract on the 7th day of April, 1898, with the Oklahoma Sanitarium Company for the care and maintenance of the insane of the Territory for three years from and after the 15th day of June, 1898. This contract fixed the compensation to be paid to said company at $200 per annum for each patient, thus reducing the expense to the Territory one-third, or 33⅓ per cent. Said contract provides that the sanitarium building shall be kept well ventilated and heated and properly supplied with pure water and adequate sewage connection, and requires said company to use all means and proper appliances and care necessary to the end that said insane persons shall be cared for in a proper, suitable, and humane manner, and to supply medical attendance, nursing, treatment, medicine, clothing, and food. It is stipulated in the contract that the laws of the State of Illinois, so far as the same are applicable, shall govern the said company in the due performance of its part of this contract, and that the superintendent of public health of Oklahoma shall visit the institutions at least twice each year and oftener if the governor shall so direct and see that the provisions of the contract are being properly complied with and that the insane are being properly and humanely cared for. The contract is not assignable without the consent of the Territory, and patients are not to be farmed out or their care and maintenance sublet.

During the past year many improvements have been made at the sanitarium. A commodious hospital has been completed and comfortably furnished, which has a capacity of 25 patients. This will add greatly to the comfort of the sick or feeble patients by keeping them from all other patients likely to disturb them. To each of the cottages an addition has been built that will accommodate 25 patients. The sewerage system is enlarged from time to time as occasion demands and now as formerly no effort is spared to keep the grounds and buildings in the best sanitary condition. There are 10 acres devoted to woodland, the trees of which are now large enough to give comfortable shade. The garden has furnished vegetables and melons in abundance and in another year the orchard and vineyard will yield plentifully of peaches, plums, and grapes. The number of patients admitted during the year and also the number under treatment at the close of the year is greater than for the year preceding. The health of the entire institution is good and everything indicates that the sanitarium is in excellent sanitary condition and most healthfully located.

From information and personal observation I believe that this class of unfortunates are receiving as good care and attention as could be had at any like institution.

During the year the Territory has paid—

For care of insane	$44,676.22
For transportation of insane	3,193.12
Total	47,869.34

The following table shows the number of patients from each county, number received, discharged, etc.:

County.	On hand July 1, 1898.	Received in one year.	Deaths.	Releases.	Escapes.	On hand July 1, 1899.
Beaver	1	3		1		3
Blaine	1	1	1			1
Canadian	13	6	1	4		14
Cleveland	12	18	2	6		22
Custer	1	5	2			4
Day						
Dewey	2	2	1			3
Garfield	11	11	6	2		14
Grant	6	3	3	2		4
Greer	4	2		2		4
Kay	10	11	2	5		14
Kingfisher	17	8	6	3		16
Lincoln	11	9	1	6		13
Logan	17	17	4	9		21
Noble	8	4	2	2		8
Oklahoma	30	19	2	15		32
Pawnee	1	6	1	1		5
Payne	15	7	2	2		18
Pottawatomie	18	16	4	9	1	20
Roger Mills		2				2
Washita	6	6		4		8
Woods	9	10	2	4		13
Woodward	3	2	1			4
Total	196	168	43	77	1	243

PUBLIC LANDS.

Owing to the great rush of settlers at each succeeding opening of Oklahoma lands the struggle to get possession of the more valuable pieces, and the constant influx of settlers each year since, the impression prevails that all the Government land in the Territory is taken up. This is not a fact. There are still 6,338,373 acres of Government land in the Territory subject to homestead entry. While some of this land is rough, broken, and rocky, and by far the greater portion of it adapted to stock raising more than farming, there is still a considerable portion well adapted to agricultural purposes, where the homeless toiler from the crowded East or cold, bleak North can secure a home for his family, and by earnest, persevering effort, not only live in comfort, but readily attain a competence for old age. This land is to be acquired under the homestead laws by a settler filing on same at the land office, taking up his residence on the land within six months thereafter, and occupying and cultivating it for five years. In Greer and Beaver counties the settler gets his land free at the end of five years, his only cost being $14 filing fees. In the other parts of the Territory the land costs him from $1 to $2.50 per acre. Through the courtesy of the registers and receivers of the several United States land offices in the Territory I am enabled to give the following interesting and valuable facts and figures relating to the lands in each district:

Guthrie land district.—There are in this district a total of 1,163,000 acres of land, all of which has been appropriated and none remains open to settlement. This land lies in four different counties, as follows:

Logan	360,000
Lincoln	390,000
Oklahoma	92,000
Payne	321,000

Oklahoma land district.—There is in this district a total area of 4,095,000 acres, 110,270 of which still remain open to settlement, as shown by the following statement:

Statement of lands, vacant, reserved, and segregated, in the Oklahoma, Okla., land district, July 1, 1899.

County.	Vacant.	Reserved.	Filed on.	Area in district.
	Acres.	*Acres.*	*Acres.*	*Acres.*
Blaine	.....	55,000	10,000	65,000
Canadian	.....	181,420	200,580	382,000
Cleveland	.....	80,000	268,000	348,000
Custer	7,500	80,000	238,500	326,000
"I"	.....	646,000	.....	646,000
Lincoln	.....	118,000	111,000	229,000
Oklahoma	3,270	36,720	308,010	348,000
Pottawatomie	.....	273,000	227,100	501,000
Roger Mills	97,000	40,000	485,000	622,000
Washita	2,500	109,000	516,500	628,000
Total	110,270	1,620,040	2,364,690	4,095,000

The 3,270 acres noted in the statement as being vacant in Oklahoma County is the land covered by the old Council Grove Military Reservation. Something like three years ago the reservation was offered at public sale. A portion of it was sold, and later the Department instructed the office that any further disposition of the remaining lands would be held in abeyance to await consideration of Congress of some measure looking to its donation to the Territory for use as a soldiers' home. County "I" includes the Wichita indian reservation which is not open to settlement.

Perry land district.—During the fiscal year ending June 30, 1899, there were made in this office 469 homestead entries, embracing an area of 62,786.94 acres. Almost the entire number of entries were made upon the filing of the relinquishment of former entries for the same land.

Status of land in Perry land district July 1, 1899.

County.	Unappropriated and unreserved.	Reserved.	Appropriated.	Total area of land surface in county.
	Acres.	*Acres.*	*Acres.*	*Acres.*
Kay	.....	46,579	526,421	573,000
Noble	.....	30,345	567,655	398,000
Pawnee	1,423	30,949	300,628	333,000
Payne	.....	10,842	152,158	163,000
Total	1,423	118,715	1,346,862	1,467,000

Enid land district.—There has been no land subject to entry in Garfield County for several years—all taken. In Grant County there is now 1,120 acres in the western part, consisting of sand hills not even fit for grazing.

Number of acres in district:	
Garfield	640,000
Grant	672,000
Total	1,312,000

Number of acres reserved:	
Garfield	74,462
Grant	75,335
Total	149,797
Number of acres filed on up to July 1, 1899:	
Garfield	565,538
Grant	595,545
Total	1,161,083
Number of acres filed on during year:	
Garfield	0
Grant	160
Number of acres still subject to entry:	
Garfield	0
Grant	1,120
Total number of entries made in Enid district to July 31, 1899	10,749

Kingfisher land district.—There is still considerable land in this district subject to homestead entry, mostly in the western part, as can be seen by the following table. There are many quarter sections of this land suitable for general farming, but the bulk of it is of course best adapted to stock raising, and upon some of it there are valuable deposits—gypsum, cement, salt, and minerals.

Status of land in Kingfisher land district from July 1, 1898, ending June 30, 1899.

County.	Unappropriated and unreserved.	Reserved.	Appropriated.	Total area land surface in county.	Brief description.
	Acres.	*Acres.*	*Acres.*	*Acres.*	
Blaine	14,240	237,040	276,720	528,000	Mountainous.
Canadian	760	39,360	98,880	139,000	Grazing, agricultural.
Custer	88,720	55,980	226,300	321,000	Do.
Day	530,520	38,400	97,080	666,000	Grazing lands.
Dewey	163,570	108,320	365,110	637,000	Do.
Kingfisher	190	74,240	493,570	568,000	Agricultural.
Logan	.....	6,400	105,600	112,000	No vacant land.
Oklahoma	.....	1,280	21,720	23,000	Do.
Roger Mills	85,120	12,160	37,720	135,000	Grazing lands.
Total	833,120	573,180	1,722,700	3,129,000	

Total entered during year	acres	295,546.32
Total entered by new settlers	do	229,884
Total reentered	do	65,662.32
Number of entries recorded		1,924

Alva land district.—This land district is coextensive with Woods County.

Total in county	acres	1,732,000
Filed on to July, 1899	do	1,507,972
Entered during fiscal year ending June 30, 1899	do	190,455
Vacant land	do	224,028
Total entries made		10,394

There are no reserved lands in this district, the saline reserves having been thrown open to settlement. Most of the vacant lands are adapted to stock raising only, and some of it very rough and broken.

Woodward land district.—This is the largest land district in the Territory and has the most vacant land, as shown by the following statement:

County.	Unreserved and unappropriated.	Reserved.	Appropriated.	Total.
Beaver	3,232,011	.....	448,989	3,681,000
Woodward	1,420,110	40,320	663,570	2,124,000
Total	4,652,121	40,320	1,112,559	5,805,000

In transmitting the above statement to me, the register and receiver of the land office add the following interesting data and information:

The records of this office show an increase of business over the previous year of $11,000; 170 more homestead entries and many more final proofs and cash entries. While there have been over 1,000,000 acres appropriated in this district, there are yet more than 4,600,000 acres of fine farming and grazing land subject to entry.

In Woodward County there appears to have been a steady increase in the amount of rainfall for the past five years, and some of the old settlers of that county assure us that they have raised a good crop of corn each season since they have been here.

While Beaver County is higher and the rainfall is less the soil is fine, produces an abundance of grass and roughness, and is unexcelled as a stock country.

Mangum land district.—This district embraces Greer County alone, and there is much good grazing land and some adapted to general farming still vacant.

Total in district	acres..	1,511,575
Filed upon to July 1, 1899	do...	993,284
Filed upon during fiscal year ending June 30, 1899	do...	149,325
Subject to entry	do...	518,291
Total entries made in district up to end of year, June 30, 1899		4,992

DISPOSITION OF GRAZING LANDS.

In view of the fact that large areas of public land in Oklahoma lying west of range 14 west are adapted to stock raising only and are not and never will be suitable for homestead purposes, it would seem advisable that some disposition be made of it, other than to hold it for exclusive homestead entry, as is the case under the present homestead law. These lands are open cattle ranges and are now used by unauthorized owners of cattle, and the possession or occupancy of the same is the subject of much contention and controversy, leading in some instances to shooting, assaults, and murder. I earnestly recommend that some arrangement be made for the authorized leasing of these lands to cattlemen, limiting and defining the ranges to be leased. A gift of these lands to the Territory for public school and public building purposes would enable the Territorial legislature to solve the question speedily and for the general welfare of the people of the whole Territory. This is not asking too much when it is considered that no donation of lands was made in original Oklahoma for college or public building purposes, and that very large quantities of our lands are held as Indian allotments, inalienable and nontaxable for any purpose.

HERD OF REGISTERED HEREFORD COWS, WOODWARD COUNTY.

SETTLEMENT OF LANDS.

Three years ago it was generally considered that all of the public lands of Oklahoma fit for homesteads had been taken up, and in fact many settlers who had taken Government land were about to give it up in discouragement, but the good crops of that year turned the tide and all who had land kept it, and in addition, as the story of the prosperity of the Territory went out over the country, settlers began to flock in and take up the vacant land, much of which had previously been rejected.

During the year ending June 30, 1898, 1,127,466 acres were filed upon, making 7,046 quarter sections with a family on nearly every one.

The annual reports of the officials of the United States land offices in the Territory, just completed, show that 666,747 acres, or 4,167 quarter sections, have been filed on during the year ending June 30, 1899, showing an influx of at least 10,000 families into the Territory during the two years to take up unoccupied Government land, besides the more than twice as many who bought relinquishments of former settlers on leased school lands.

There is still in the Territory 6,338,373 acres of vacant public land subject to homestead entry.

Some of this is good agricultural land, and hundreds of people are daily coming into the Territory to seek out locations upon it.

The number of acres of land filed upon during the year and the number of acres still vacant is shown by counties in the following table:

County.	Filed on.	Still vacant.	County.	Filed on.	Still vacant.
	Acres.	*Acres.*		*Acres.*	*Acres.*
Beaver	23,994	3,232,011	Oklahoma	----------	3,720
Blaine	3,520	14,240	Pawnee	730	1,423
Canadian	----------	760	Pottawatomie	----------	----------
Custer	54,044	44,220	Roger Mills	17,490	182,120
Day	56,740	530,520	Washita	15,500	2,500
Dewey	110,480	163,570	Woods	148,485	224,028
Grant	160	1,120	Woodward	86,128	1,420,110
Greer	149,486	518,200			
Kingfisher	----------	190	Total	666,747	6,338,373

BANKS AND BANKING.

A statement of the condition of the banks of the Territory speaks volumes of the general prosperity of all our people. There are in the Territory 68 Territorial or State banks and 7 national banks with an aggregate paid up capital of $954,600. These banks are without exception in a flourishing condition and on a sound basis, and with a reserve fully four times as large as contemplated by law, being greater than that held by the banks of any other State or Territory, and the prospect of immediate and continued increase in deposits and legitimate business by the moving of crops and general business expansion of the Territory, I can not but feel that the people of the Territory are to be congratulated upon the character and stability of their financial institutions.

I give below a comparative statement of the condition of the State banks of the Territory at the close of business on June 30, for three years past:

Comparative statement State banks of Oklahoma.

	1897.	1898.	1899.
ASSETS.			
Loans and discounts	$1,126,795.37	$1,420,202.99	$1,646,332.43
Warrants and bonds	100,573.68	78,388.74	87,975.02
Overdrafts	70,514.05	55,786.09	94,576.68
Real estate, furniture, and fixtures	202,398.80	159,784.96	271,710.20
Cash and sight exchange	743,756.09	1,561,262.37	1,830,128.12
Total	2,244,037.99	3,275,425.15	3,930,720.45
LIABILITIES.			
Capital	613,328.70	509,786.69	604,600.00
Surplus and profits	115,621.36	205,153.28	286,952.67
Deposits	1,499,149.69	2,560,485.18	3,022,373.01
Bills payable and rediscounts	15,938.24		16,794.77
Total	2,244,037.99	3,275,425.15	3,930,720.45
THE GAINS MADE.			
Reserve.....per cent..	49	60	65
Gain in deposits		1,061,335.49	461,887.87
Gain in cash		817,506.33	268,865.75
Gain in loans and discounts		293,407.62	226,129.44

Total gain in deposits in two years		$1,523,223.32
Gain in deposits in two years	per cent..	103
Total gain in cash in two years		$1,086,372.08
Gain in cash in two years	per cent..	146

These banks are all organized and conducted under a comprehensive and conservative Territorial banking law, subject at all times to examination by the bank examiner, and required to make quarterly reports, all of which inspires the confidence of the general public in the banks of the Territory and secures a liberal patronage from all classes of people.

In a recent brief report to me the bank commissioner says:

During the past two years practically all of the State banks have been reorganized to comply with the banking laws, but only 49 State banks were doing business on June 30, 1898.

During the past year 19 banks have been organized, and we have not had a failure for two years.

The banks at the present time under control of this department are, without exception, in an excellent and prosperous condition, and considering the present prospects we have every reason to expect them to gain 25 per cent in deposits before January 1, 1900.

The condition of the 7 national banks of the Territory is fully as prosperous as the Territorial banks, as shown by the following statement of their condition on June 30, 1899, furnished by the honorable Comptroller of the Currency:

Condition of national banks of Oklahoma June 30, 1899.

RESOURCES.	
Loans and discounts	$799,391.80
Overdrafts	14,753.39
United States bonds to secure circulation	112,500.00
United States bonds on hand	6,000.00
Premium on United States bonds	7,875.00
Stocks, securities, judgments, etc	54,586.20
Banking house, furniture, and fixtures	58,992.52
Other real estate and mortgages owned	447.86
Due from other national banks	102,854.50
Due from State and private banks	20,329.74
Checks and other cash items	87,475.68
Due from approved reserve agents	411,335.03
Exchanges for clearing house	318.76
Notes of other national banks	34,785.00

Fractional paper currency, nickels, and cents	$1,446.24
Specie	95,546.30
Legal-tender notes	45,681.00
Five per cent redemption fund	5,062.50
Due from United States Treasurer	560.00
Aggregate	1,809,941.42

LIABILITIES.

Capital stock paid in	350,000.00
Surplus fund	30,500.00
Undivided profits, less expenses	42,210.66
National-bank notes outstanding	100,250.00
Due to other national banks	10,589.69
Due to State and private banks	58,789.45
Individual deposits	1,217,601.62
Aggregate	1,809,941.42

This shows a gain in deposits of $146,111,26, or 13 per cent for the year.

BUILDING AND LOAN ASSOCIATIONS.

Four building and loan associations are in operation, chartered under the laws of the Territory, and are all doing a good business.

These associations encourage habits of saving in the people and help greatly to build up the towns where they are operated. They help people to own their own homes, which is always a good thing, for, as a general proposition, the man who owns a home is a better citizen than one who does not.

The stock and mortgages of these local associations are exempted from taxation, all associations are compelled to make sworn statements semiannually to the secretary of the Territory and the business hedged about by good laws on the subject.

Many outside associations, attracted by the general prosperity of the people of the Territory, are securing large lists of members in almost every town, taking out large sums of money but doing little or nothing to build up the Territory.

The Guthrie association, which is the oldest in the Territory, has $42,320 loaned to members. Their cash receipts the past six months were $8,443.82, and they declared a 6 per cent dividend for the six months. Their dividends have averaged over 18 per cent a year and they have built 120 homes.

The Norman association has $14,558.52 invested and has declared dividends ranging from 12 to 20 per cent per annum.

The Oklahoma City association, though but six months old, has $5,150 loaned on real estate valued at $16,000, the average loan being $572.

The Shawnee association has been doing business but a few weeks, but has collected $480 from stockholders.

INSURANCE.

The prosperity of the past year has caused an increase in the business done by insurance companies in the Territory. There are 39 fire, 19 life, and 6 accident and casualty companies licensed to do business in the Territory. In addition to this, the various fraternal orders carry large amounts of insurance in Oklahoma. The legislature at its last session passed an act providing for the organization of mutual companies by 1,000 or more farmers to insure grain, live stock, and farm buildings, and several companies have incorporated and are organized under this law.

The business done by outside companies in the Territory during the year 1898 was as follows:

Fire insurance.

Name of company.	Location.	Insurance written in 1898.	Premiums received.	Losses paid.	Losses incurred.
Ætna	Hartford, Conn	$297,785.00	$4,706.68	$458.33	$458.33
American Central	St. Louis, Mo	245,762.00	3,952.03	367.99	367.99
British America Assurance Co.	Toronto, Canada	89,697.00	1,533.11		
Connecticut Fire	Hartford, Conn	611,915.00	9,985.86	518.26	1,218.98
Commercial Union	London, England	20,913.00	417.46		
Delaware	Philadelphia, Pa	214,420.00	4,969.00	79.00	164.00
Fire Association of Philadelphia.	do	310,413.00	8,569.09	190.92	216.17
Fort Wayne	Fort Wayne, Ind	40,420.00	1,153.69		438.93
German Alliance	New York	60,200.00	1,000.32	7.25	7.25
German American	do	596,100.55	10,137.38	297.96	943.86
Greenwich	do	57,760.00	992.19	684.37	684.37
Hamburg-Bremen	Hamburg, Germany	9,450.00	192.68		
Hartford Fire	Hartford, Conn	447,860.00	6,285.78	1,833.46	1,766.73
Imperial, limited	London, England	41,350.00	773.26		
Insurance Co. of North America.	Philadelphia, Pa	249,912.00	5,936.14	379.76	315.49
Liverpool, London and Globe	Liverpool, England	492,876.00	9,344.95	3,988.34	1,488.94
London and Lancashire	do	361,778.00	9,807.58	1,649.18	1,149.18
Manchester Fire Association	Manchester, England.	40,375.00	1,121.26		
Merchants, The	Newark, N. J	290,504.07	4,336.16	18.08	736.19
Milwaukee Fire	Milwaukee, Wis	31,575.00	802.93	250.00	250.00
Milwaukee Mechanics	do	56,976.00	1,442.96	32.83	32.83
Niagara Fire	New York	348,438.00	5,386.05	1,053.44	1,453.44
Norwalk Fire	Norwalk	17,217.00	398.32	180.65	180.65
North British and Mercantile	London, England	174,725.00	3,301.48	205.00	205.00
Orient	Hartford, Conn	305,931.00	6,214.18	57.40	59.90
Pennsylvania Fire	Philadelphia, Pa	262,251.00	6,009.13	1,356.52	456.52
Phenix	Brooklyn, N. Y	1,113,295.00	18,996.50	1,064.89	1,728.98
Phœnix	London, England	20,900.00	382.40		
Providence of Washington	Providence, R. I	130,025.00	1,658.15	16.45	16.45
Royal	Liverpool, England	84,555.00	1,392.47	77.35	77.35
St. Paul Fire and Marine	St. Paul, Minn	71,400.00	1,384.86		310.00
Shawnee	Topeka, Kans	259,617.00	4,966.84	499.55	849.59
Scottish Union and National	Edinburgh, Scotland	237,791.36	6,353.16	1,250.96	2,518.50
Springfield Fire and Marine	Springfield, Mass	309,649.00	12,764.64	780.92	2,533.09
Traders	Chicago, Ill	185,380.00	4,420.87	351.56	1,082.00
Western Assurance Co	Toronto, Canada	111,452.00	2,496.62	187.16	687.16
Westchester Fire	New York, N. Y	148,869.00	3,912.05	170.30	2,293.06
Virginia State Insurance Co			150.00		
St. Joseph Town Mutual					
Total		8,839,556.98	167,680.23	18,001.84	24,637.83

Life insurance.

Name of company.	Location.	Policies issued during the year 1898.	Losses incurred.	Losses paid.	Premiums received during 1898.
Manhattan Life Insurance Co	New York, N. Y				$235.80
Covenant Mutual	St. Louis, Mo	$5,007.75			334.91
Equitable Life Assurance Society.	New York, N. Y	133,438.00	$2,250.00	$2,250.00	8,455.15
Home	do				2,298.11
Kansas Mutual Life	Topeka, Kans	2,250.00			25.35
Massachusetts Mutual	Springfield, Mass	32,000.00	5,500.00	5,500.00	4,639.54
Merchants' Life Association of United States.	St. Louis, Mo	5,000.00			111.23
Mutual Reserve Fund	New York, N. Y	67,000.00	4,000.00	4,000.00	6,289.07
New York Life	do	827,500.00	32,445.35	32,445.35	29,157.16
Northwestern Mutual Life	Milwaukee, Wis	140,187.00	4,147.00	3,147.00	11,777.80
Pacific Mutual	San Francisco, Cal	5,000.00			174.94
Mutual Life Insurance Co. of New York.	New York, N. Y	118,534.00	5,500.00	5,500.00	9,701.28
State Life	Indianapolis, Ind	198,000.00			1,261.99
Connecticut Indemnity Association.	Waterbury, Conn				
Hartford	Hartford, Conn	18,500.00	2,000.00	2,000.00	1,488.55
National Life Assurance	do				
Union Central	Cincinnati, Ohio	41,800.00			206.05
Mutual Life Insurance of Kentucky.	Louisville, Ky	149,000.00			356.65
Banker Life Insurance Co. of Nebraska.	Lincoln, Nebr				

Miscellaneous.

Name of company.	Location.	Premiums received.	Losses paid.	Losses incurred.	Amount of risks at end of year.
American Surety Co. of New York.	New York				$1,500.00
Fidelity and Casualty Co	do	$2,480.00	$382.28	$382.28	
Lloyds Plate Glass Insurance Co.	do	247.47	26.75	26.75	7,993.95
The Travelers	Hartford, Conn	971.55	75.71	75.71	37,590.00
United States Fidelity and Guaranty.	Baltimore, Md				607.00
Preferred Accident Insurance Co.	New York	69,000.00	516.00	516.00	288.00

RAILWAYS AND TRANSPORTATION.

The returns made to the Territorial board of railway assessors in March show a total railroad mileage in the Territory of 920.65 miles, of which 686.13 was main track. Since that time nearly 100 miles more of main track have been completed and put in operation.

The main track returned by the different roads was as follows:

	Miles.
Southern Kansas (Santa Fe), Arkansas City Division	144.36
Kiowa Division (Santa Fe)	116.30
Choctaw, Oklahoma and Gulf	125.77
Chicago, Rock Island and Pacific	116.16
Kansas and Southern	9
St. Louis and Oklahoma City (Frisco)	65.71
Hutchinson and Southern	47
Tecumseh	5.12

The main-track mileage, by counties, is as follows:

	Miles.
Oklahoma	87.27
Lincoln	71.14
Grant	67.12
Woodward	65.72
Canadian	64.52
Kay	63.27
Woods	46.80
Logan	33.28
Noble	37.25
Pottawatomie	30.94
Kingfisher	30.54
Garfield	29.84
Cleveland	21.63
Caddo Reservation	16.70
Blaine	8.58
Payne	4.19
Day	3.78
Custer	3.56

Beaver County has no main track, but about three-fourths of a mile of switch of the Rock Island extends into the county.

Five counties—Pawnee, Greer, Dewey, Washita, and Roger Mills—have no railway.

The valuations of the various lines for taxation is as follows:

Southern Kansas (Santa Fe), Arkansas City Division	$970,160.98
Kiowa Division (Santa Fe)	469,160.93
Choctaw, Oklahoma and Gulf	690,272.00
Chicago, Rock Island and Pacific	689,382.71
St. Louis and Oklahoma City (Frisco)	319,298.38

Hutchinson and Southern	$164,886.07
Kansas and Southern	18,950.00
Tecumseh	17,476.82
Total	3,338,344.89

No new country has ever had the railway facilities that have been accorded Oklahoma from the first. Many old settled States do not have equal transportation facilities with the Territory to-day; and within a very few years the railway communication between different parts of the Territory and between the Territory and the great centers of commerce and all parts of the nation will be equal to that of any State or Territory, and superior to many.

Four great trunk lines now operate in the Territory and others are coming.

The main Gulf line of that greatest of American railway systems, the Atchison, Topeka and Santa Fe, crosses the eastern portion of the Territory from north to south, giving a direct line to the Gulf on the south, the markets of Kansas City and Chicago to the north and east, and those of the mountains to the west, as well as an unbroken line to the Pacific.

In the western part of the Territory the Pan Handle branch of the Santa Fe runs diagonally through Woods and Woodward counties, offering ready shipment for the agricultural products and the great herds of cattle of that vast country.

Another branch of this same road now runs to Blackwell and Tonkawa, and in the near future branches will reach the principal towns of Pawnee and Payne counties and on east into the Indian Territory.

Branches will also reach out to points in the central western section of the Territory. They are now constructing a line from Guthrie, east via Langston, Perkins, Stillwater, and other points, to the coal fields of the Indian Territory.

Running parallel and about 40 miles west of the Santa Fe is the Gulf Line of the Great Rock Island Route, reaching the Gulf ports to the south; Kansas City, Omaha, and Chicago to the north and east, and Denver and the Rockies to the west. A branch line extends west through the great Indian reservation of the southwest to Anadarko Indian Agency, noted in history and fiction, to the historic military post of Fort Sill and the site of old Fort Cobb, with its tragic memories of the past, to the counties of the southwestern part of the Territory and to the very foot of the beautiful and far-famed Wichita Mountains. It also touches Beaver County on the north, a spur extending into the county.

Almost entirely across the southern portion of the Territory from east to west is the Choctaw, Oklahoma and Gulf Railway, soon to be a trunk line running direct to Memphis on the east and into Texas and New Mexico on the west. This line extends far into western Oklahoma, connects the Santa Fe and Rock Island in the Territory and east in the Indian Territory; connects with the Missouri, Kansas and Texas, the Frisco, the Missouri Pacific, and the Pittsburg and Gulf, direct trunk lines to the Gulf, to the Mississippi, St. Louis, Kansas City, and Chicago, and from thence to all parts of the country.

The St. Louis and San Francisco crosses the southeastern portion of the Territory and connects with the Santa Fe and Choctaw at Oklaloma City. It gives direct connection with the mining regions of Missouri and Arkansas and with St. Louis and Kansas City and with the various other great lines leading out of these cities. A

branch line also enters the northern part of the Territory from Arkansas City, Kans., running to Blackwell.

In the northern part of the Territory is the Hutchinson and Southern road entering the Territory at Manchester, and running southeast crosses the Rock Island at Medford, connects with branches of the Santa Fe and Frisco at Blackwell, and intersects the main line of the Santa Fe at Cross. This line connects at Hutchinson with the Union Pacific and other lines and is daily becoming of more importance to the Territory. They contemplate building from Cross to Grey Horse in the Osage country and on southeast during the year.

The Tecumseh Railway connects Tecumseh with the Choctaw at Shawnee.

The Missouri Pacific System reaches the north line of the Territory at Elgin, Arkansas City, and Kiowa, Kans.

All the railways in the Territory have made many improvements during the past year and have still further improvements and extensions in view for the coming year.

SANTA FE.

F. T. Dolan, division superintendent of the Santa Fe, says in a recent communication to me:

During the past year the Atchison, Topeka and Santa Fe Company have completed putting in new steel bridge, composed of six 60-foot girders and stone piers, over the North Fork of the Canadian, near Woodward; have put in six 80-foot steel girders and stone piers over the Salt Fork, near Alva. It is the intention to put in three additional 80-foot steel girders over this stream next year, which will take out entirely all of the timber. Have completed new steel bridge, with stone piers, over the Salt Fork, near White Eagle; have put in five large brick arches, relieving timber trestle bridges, also four steel girder bridges, relieving timber trestles between Arkansas City and Purcell. Expect to put in several additional arches and steel bridges on this line next year. Have just about completed new water plant at Newkirk; have opened up new agency station at Bliss, and will probably put in new depot at that point next year. Have commenced the renewal of quite a number of station platforms at important stations with brick. Have ballasted about 50 miles of track south of Arkansas City with rock ballast, crushed at quarries at Ponca City and Dougherty; expect to have the line between Arkansas City and Purcell all ballasted early next year. Have put in five new side tracks in Oklahoma during the past year. It is very likely that the company will lay several miles of new rail in the Territory next year, but I am not definitely advised on this subject at the present time. Have also completed new block system between Arkansas City and Purcell. The block system necessitated the building of additional telegraph wire and putting up 25 block signals at the different stations, also employment of 25 or 30 additional operators. The block system is an additional safety appliance in handling trains, making it almost impossible for head or rear end collisions to occur. We have just commenced work on renewal of telegraph line between Arkansas City and Purcell, putting in new poles and cross arms.

ROCK ISLAND.

W. E. Dauchy, superintendent of maintenance and construction for the Rock Island lines west of the Missouri, in answer to my inquiry for information as to work of the year and plans for the future in the Territory, says:

With reference to track laid in the Territory: We have laid 51.22 miles of main track and 2.63 miles of side track in construction of a line from Chickasha, Ind. T., to Mountain View, Okla., of which 2 miles of main track, and 0.23 miles of side track are in the Indian Territory, and 49.22 miles of main track and 2.40 miles of side track are in the Territory of Oklahoma. In addition to the construction of this line, we have laid 2.67 miles in extending side tracks, etc.

With reference to improvements in train service: Mail and express trains, Nos. 3 and 4, running between Kansas City and Fort Worth, made daily instead of

daily except Sunday, due to increase in travel. Straight baggage-car service established on trains 3 and 4, instead of combination baggage and mail car, made necessary on account of heavy increase in movement of baggage and express. Daily except Sunday service established between Chickasha and Mountain View, due to new extension. Freight-train service has greatly increased during past year, requiring additional trains, as well as yard engines at El Reno and Chickasha.

With reference to improvement in roadbed: We have made no improvements except necesary repairs to keep tracks in first-class condition.

With reference to new depots built in the Territory: We have constructed depots between Chickasha and Mountain View as follows: One at Anadarko, one at Fort Cobb, and one at Mountain View. We have also constructed large stock-shipping pens at Anadarko, Fort Cobb, Lathrom, and Mountain View. We have also constructed five section houses on this line. On division from Caldwell to Chickasha, depots have been enlarged at Pond Creek, Enid, Hennessey, Kingfisher, and El Reno. All stock pens in the Territory have been enlarged and improved on account of shipments.

With reference to improvements contemplated during the coming year: Will say that we have in view the construction of a line from Kingfisher to Guthrie. We are now building a line from North Enid to Tonkawa, and one from Anadarko to Fort Sill.

HUTCHINSON AND SOUTHERN.

L. E. Walker, vice-president and general manager of this line, furnishes the following information:

We have just completed a 15-mile extension from Blackwell to Cross. We are about to put in effect a new time card, which will give us four passenger trains a day between Cross and Medford, and two passenger trains a day over the balance of the line, and two freight trains a day over the entire line in Oklahoma.

In a general way our roadbed has been considerably improved between Medford and Blackwell, but not in any special manner.

We have built during the year new depots at Manchester, Medford, Deer Creek, Nardin, and Blackwell, and there are now under construction new depots at Virginia and Cross.

Another extension of about 40 miles has been commenced from Cross.

The line has been located about 9 miles, almost straight east, from Cross, and we then cross the river into the Osage Nation. Our engineers are now at work in the Osage Nation, and to just what point the line will be extended I am unable to say. They are now running southeast.

CHOCTAW.

This line was extended to Weatherford during the year and new depots put in at Geary, Weatherford, and several other points, also roundhouse at Weatherford. The roadbed has been generally improved along the whole line. The shops at Shawnee have been enlarged and the force increased. The train service has been extended and improved and as soon as the eastern extensions now building in Arkansas are completed through vestibule trains will be put on from Memphis, making as fast time as any road in the West. They also contemplate an extension west.

FRISCO.

This line has entered the Territory within the year, but is already doing a large business. Their extension from Sapulpa, Ind. T., to Oklahoma City was completed during the winter and a through-train service put on at once. The line to Blackwell from Arkansas City, Kans., is just about complete and may go farther southwest; they are also surveying for an extension southwest from Oklahoma City to Greer County.

AN ERA OF RAILWAY BUILDING.

Four railways are now building in the Territory; three lines were built the past year. Several more are now being surveyed and enough other lines projected to indicate with a degree of certainty that within the next year or two Oklahoma will experience an era of railway building such as has not been seen anywhere in the country for some years.

The records of the Territorial secretary show the following railway companies incorporated during the past eighteen months:

Railways chartered since January 1, 1898.

Missouri, Oklahoma and Texas Railway Company, through the counties of Cleveland, Pottawatomie, and Lincoln. Capital stock, $800,000. Directors, D. T. McDonough, S. Clay, W. Christian, A. T. Foster, and E. B. Mundy, of Tecumseh. Place of business, Tecumseh, Okla.

The New Orleans and Oklahoma City Railroad Company, through the counties of Grant, Garfield, Kingfisher, Logan, Oklahoma, and Pottawatomie. Capital stock, $4,000,000. Directors, C. G. Jones, D. C. Lewis, H. Overholser, and S. A. Steward, of Oklahoma City, and W. C. Renfrow, of Guthrie. Place of business, Oklahoma City, Okla.

The El Reno and Southwestern Railroad Company, through the counties of Canadian, Washita, and Greer. Capital stock, $1,000,000. Directors, N. B. Wass, A. F. Masterman, J. F. McElrath, A. F. Newell, J. S. Kerfoot, jr., W. H. Riley, T. F. Hensley, and J. S. Morrison, of El Reno. Place of business, El Reno, Okla.

Muscogee Coal and Railway Company, through the counties of Lincoln, Payne, and Logan. Capital stock, $1,250,000. Directors, Joseph W. McNeal, U. C. Guss, W. M. Spurlock, Frank H. Greer, and C. G. Hornor, of Guthrie. Place of business, Guthrie, Okla.

Hutchinson and Southern Railroad Company, through the counties of Grant, Kay, Garfield, Kingfisher, Logan, Noble, Payne, Lincoln, Pawnee, and Pottawatomie. Capital stock, $7,000,000. Directors, W. A. Bradford, jr., of Boston, Mass.; S. E. Walker, W. M. Whitelaw, John A. S. Graves, and E. B. Sherman, of Hutchinson, Kans. Place of business, Hutchinson, Kans.

St. Louis, Tecumseh and Lexington Railway Company, through the counties of Lincoln, Pottawatomie, and Cleveland. Capital stock, $500,000. Directors, D. B. Madden, Frederick King, and S. J. Scott, of Tecumseh, Okla.; Thomas McColgan, of Adell, Okla., and William T. Harness, of Lexington, Okla. Place of business, Tecumseh, Okla.

Oklahoma Central Railway Company, through the counties of Oklahoma, Canadian, Logan, Kingfisher, Blaine, Woods, Woodward, "D," Day, and Custer. Capital stock, $15,000,000. Directors, O. P. Hamilton, of Salina, Kans.; Herman Bruen, of New York, N. Y.; Paul Cook, of Kansas City, Mo.; C. S. Burrell and Philip Koch, of Watonga, Okla.; Thomas H. Davis, of Salina, Kans., and MacGregor Douglas, of Oklahoma City, Okla. Place of business, Watonga, Okla.

Arkansas, Guthrie and California Railway Company, through the counties of Pottawatomie, Lincoln, Logan, Kingfisher, Blaine, "G," "D," and Day. Capital stock, $5,000,000. Directors, Henry Hudson, J. W. McNeal, J. M. Brooks, A. A. Humphrey, Frank H. Greer, and William H. Coyle, of Guthrie, Okla.; W. S. Search, of Shawnee, Okla., and H. L. Miller, of Guthrie, Okla. Place of business, Guthrie, Okla.

The Gulf and Northern Railroad Company, through the counties of Grant, Kay, Garfield, Noble, Pawnee, Payne, Lincoln, Logan, Oklahoma, Cleveland, Pottawatomie, Kingfisher, Blaine, Woods, and Woodward. Capital stock, $20,000,000. Directors, J. W. McNeal, Horace Speed, A. G. C. Bierer, H. L. Miller, and G. E. McKeeby, of Guthrie, Okla. Place of business, Guthrie, Okla.

Wichita Falls and Oklahoma City Railway Company, through Canadian, Cleveland, and Oklahoma. Capital stock, $1,000,000. Directors, Joseph A. Kemp, Robert E. Huff, Augustus Newby, Otis T. Bacon, and George B. Stone, of Wichita Falls, Tex.; C. G. Jones and D. C. Lewis, of Oklahoma City, Okla.

Shawnee, Oklahoma and Missouri Coal and Railway Company, through the counties of Cleveland and Pottawatomie. Capital stock, $1,000,000. Directors, C. J. Benson and George McLogan, of Shawnee, Okla.; W. A. Havner, of South McAlester, Ind. T.; H. B. Dexter, M. J. Bentley, B. F. Mann, and J. M. Aydelotte, of Shawnee, Okla. Place of business, Shawnee, Okla.

The Kansas, Oklahoma Central and Texas Railway Company, through the counties of Woods, Blaine, Kingfisher, Canadian, Oklahoma, Cleveland, and Pottawatomie. Capital stock, $5,000,000. Directors, O. P. Hamilton and T. H. Davis, of Salina, Kans.; C. A. McBrian, of Watonga, Okla.; MacGregor Douglas, of Oklahoma City, Okla.; Frank Hageman, of Salina, Kans.; C. S. Burrell and Philip Koch, of Watonga, Okla.; G. N. Moses, of Grand Bend, Kans., and A. L. Sweet, of Van Wert, Ohio. Place of business, Watonga, Okla.

Shawnee, Oklahoma and Indian Territory Railroad Company, through the counties of Pottawatomie and Lincoln. Capital stock, $1,250,000. Directors, C. N. Points, W. J. Legg, T. J. Lizzell, R. E. Wood, and W. J. Estes, of Shawnee, Okla.; Thomas McColgan, of Adell, Okla., and John W. Rizeika, of Shawnee, Okla. Place of business, Shawnee, Okla.

Tecumseh and Shawnee Railroad Company, through the county of Pottawatomie. Capital stock, $15,000. Directors, W. Christian, J. W. Moyle, J. F. Rush, J. W. Saxan, and W. R. Asher, of Tecumseh, Okla., and C. M. Cade, of Shawnee, Okla. Place of business, Tecumseh, Okla.

Indian Territory, Guthrie and Western Railroad Company, through the counties of Pottawatomie, Lincoln, Oklahoma, Logan, Kingfisher, Blaine, Dewey, Woods, and Woodward. Capital stock, $1,000,000. Directors, M. Luther West, of Guthrie, Okla.; H. C. St. Clair, of Kingfisher, Okla.; B. F. Woodworth, of Downs, Okla.; E. P. Stearns, of Shawnee, Okla.; W. R. Stapleton and J. B. Beadles, of Guthrie, Okla.; C. M. Cade, of Shawnee, Okla.; C. H. Filson, of Guthrie, Okla.; F. L. Winkler, of Kingfisher, Okla.; D. F. Smith, of Guthrie, Okla.; J. B. Gaylord, of Tecumseh, Okla.; George S. Green, of Guthrie, Okla., and Nathaniel McKay, of Washington, D. C. Place of business, Guthrie, Okla.

The Blackwell and Southern Railway Company, through the counties of Kay and Noble. Capital stock, $350,000. Directors, Henry E. Asp, U. C. Guss, and W. H. Merten, of Guthrie, Okla.; Edward P. Ripley and E. D. Kenna, of Chicago, Ill. Place of business, Guthrie, Okla.

The Denver, Kingfisher and Gulf Railroad Company, through the counties of Woods, Blaine, Kingfisher, Canadian, Oklahoma, Cleveland, and Pottawatomie. Capital stock, $15,000,000, Directors, F. L. Winker, J. A. Overstreet, W. F. Bort, David Badger, and George Newer, of Kingfisher, Okla. Place of business, Kingfisher, Okla.

The Kansas, Oklahoma and Texas Railroad Company, through the counties of Pawnee, Paine, Logan, Kingfisher, Oklahoma, Canadian, and Washita. Capital stock, $7,000,000. Directors, Frank H. Greer, F. A. Derr, W. R. Welch, and J. P. Winton, of Guthrie, Okla., and E. P. Greer, of Winfield, Kans. Place of business, Guthrie, Okla., and St. Louis, Mo.

Washita Valley Railway Company of Oklahoma, through the counties of Washita, Custer, and Roger Mills. Capital stock, $100,000. Directors, E. T. Cook, J. H. Dalton, W. H. Dean, W. H. H. Cranford, and Henry N. Berry. Place of business, Cloud Chief, Okla.

Pawnee and Arkansas Valley Railway Company, through the county of Pawnee. Capital stock, $100,000. Directors, C. W. Rambo, J. D. Shepard, H. C. Hanna, Robert Chasteen, O. M. Lancaster, I. K. Berry, W. S. Egleston, C. J. Shapard, and W. C. Horton, of Pawnee, Okla.; John R. Skinner, of Blackburn, Okla.; G. W. Sutton and W. H. Herbert, of Cleveland, Okla. Place of business, Pawnee, Okla.

The Oklahoma City and Western Railroad Company, through the counties of Oklahoma, Cleveland, and Canadian. Capital stock, $3,000,000. Directors, C. G. Jones, H. Overholser, D. C. Lewis, and E. Overholser, of Oklahoma City, Okla., and F. H. Thwing, of Guthrie, Okla. Place of business, Oklahoma City, Okla.

Enid and Tonkawa Railway Company, through the counties of Garfield, Noble, and Kay. Capital stock, $60,000. Directors, M. A. Low, F. B. Dixey, and H. D. Crosby, of Topeka, Kans.; C. H. Thompson and Ivan G. Conkling, of North Enid, Okla. Place of business, Enid, Okla.

Oklahoma and Gulf Railway Company, through the counties of Pawnee, Payne, Logan, Kingfisher, and Canadian. Capital stock, $3,000,000. Directors, H. C. Hanna, I. K. Berry, J. N. Coulter, O. M. Lancaster, and C. J. Wrightsman, of Pawnee, Okla. Place of business, Pawnee, Okla.

The Eastern Oklahoma Railway Company, through the counties of Logan, Payne, and Lincoln. Capital stock, $2,200,000. Directors, Aldace F. Walker, of New York, N. Y.; Edward P. Ripley and Edward D. Kenna, of Chicago, Ill.; Frank T. Dolan, of Wichita, Kans.; Henry E. Asp, U. C. Guss, and W. H. Merten, of Guthrie, Okla. Place of business, Guthrie, Okla.

The Oklahoma, Okmulgee and Southern Railroad Company, through the counties of Kay, Noble, and Pawnee. Capital stock, $3,000,000. Directors, Gaunt

Crebs, of Kansas City, Mo.; C. H. Kimball, of Parsons, Kans.; Horace Speed, B. H. Richardson, and D. T. Flynn, of Guthrie, Okla. Place of business, Guthrie, Okla.

Denver, Oklahoma and Gulf Railway Company, through the counties of Grant, Woods, Cleveland, Pottawatomie, Grayson, Montague, Cooke, Garfield, Kingfisher, Logan, Oklahoma, and Lincoln. Capital stock, $8,000,000. Directors, E. C. Darley, Charles J. Dorrance, W. W. Oakley, F. K. Dorrance, and S. B. McConnell, of Chicago, Ill.; Henry Hudson, of Guthrie, Okla.; W. H. McLean, of St. Louis, Mo.; Avery A. Humphrey and James M. Brooks, of Guthrie, Okla.

COMMERCE.

With her wheat going to all America and Europe, her flour to al parts of this continent and by cargo direct to Liverpool, her cotton to the spinning mills of New England, Mexico, England, and even far-off Japan; her hogs and cattle to the markets and slaughter pens of the nation, and to Cuba and South America; cedar logs to the pencil factories of Germany; castor beans to the oil presses of the Old World; and fruits and melons to the city markets of the North, together with clothing, dry goods, groceries, implements, vehicles, machinery, furniture, and other articles of consumption coming in, Oklahoma has a commerce which many communities five times her age would be proud to attain.

The shipments in and out of the Territory, and between points within the Territory, have increased largely within the past year, and from present indications will show a still greater increase the coming year.

I give below tables showing shipments in and out of the Territory, furnished by the different railway companies doing business here:

ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY.

Carloads of articles shipped from Oklahoma stations during the year ending June 30, 1899.

Stations.	Cattle.	Hogs.	Sheep.	Horses.	Wheat.	Corn.	Oats.	Castor beans.	Cotton seed.	Hay.	Melons.	Cotton.	Flour.	Other mill stuff.
Asp	----	----	----	----	2	----	----	----	----	----	----	----	----	----
Alva	39	44	----	----	569	17	----	1	3	----	1	----	----	1
Bliss	126	2	----	----	89	4	----	----	----	----	25	----	----	----
Britton	----	----	----	----	3	2	----	----	----	----	----	----	----	----
Cross	----	----	----	----	4	----	----	----	----	----	----	----	----	----
Curtis	117	1	----	----	----	----	----	----	----	----	----	----	----	----
Eagle Chief	----	----	----	----	1	----	----	----	----	----	----	----	----	----
Edmond	19	42	----	----	55	11	----	----	7	----	----	7	19	5
Gage	488	----	2	----	----	----	----	----	----	----	----	----	----	----
Guthrie	116	138	----	1	75	6	3	21	50	----	38	560	40	23
Heman	402	----	3	----	----	----	----	----	----	----	----	----	----	----
Kildare	5	12	----	1	385	2	----	----	----	----	----	----	----	----
Lawrie	----	3	----	----	32	1	----	----	----	----	72	----	----	----
Moore	----	35	13	1	103	39	9	----	----	----	----	----	----	----
Mulhall	68	119	1	2	261	3	2	23	3	----	----	5	3	1
Newkirk	11	42	----	1	567	----	----	----	----	2	----	----	----	----
Noble	214	16	----	----	----	35	1	----	----	----	----	3	----	----
Noel	17	----	----	----	----	----	----	----	----	----	----	----	----	----
Norman	71	94	----	2	28	179	7	3	----	----	1	96	69	23
Oklahoma	37	102	1	5	152	20	2	2	28	----	2	1,087	191	73
Orlando	22	38	----	----	74	25	----	10	----	1	----	5	----	1
Perry	88	316	1	1	728	73	----	43	13	----	----	192	80	41
Ponca City	73	249	----	2	609	41	----	8	----	----	----	----	30	22
Redrock	940	88	7	1	112	2	----	20	1	----	----	3	----	----
Seward	----	1	----	----	72	----	----	----	----	----	36	----	----	----
Warren	----	----	----	----	59	----	----	----	----	----	----	----	----	----
Waterloo	----	----	----	----	----	1	----	----	----	----	----	----	----	----
Waynoka	16	----	----	----	5	1	----	----	----	----	----	----	----	----
White Eagle	532	3	55	----	129	----	----	2	----	----	----	----	----	----
Woodward	725	2	----	2	22	3	----	2	2	----	----	----	----	----
Total	4,125	1,347	83	19	4,137	465	24	135	107	3	175	1,908	432	194

Carloads of articles shipped to Oklahoma stations during year ending June 30, 1899.

Stations.	Farm machinery and implements.	Vehicles.	Emigrants goods.	Coal.	Flour.
Alston				3	
Asp				7	
Alva	31	5	43	171	60
Bliss	9		1	5	4
Britton			1		
Chilloceo				43	2
Curtis	1		3		3
Eagle Chief			1		
Edmond	5		22	35	
Gage	1		1	1	6
Guthrie	56	13	40	181	66
Heman			1		
Kildare	3	1	9	32	8
Moore	1		1	2	
Mulhall	16		19	20	23
Newkirk	31	4	8	89	19
Noble	4		1		2
Norman	19	3	9	41	16
Oklahoma	60	6	26	21	13
Orlando	4		14	10	15
Perry	88	15	87	117	85
Ponca City	36	7	22	68	57
Redrock	19	3	4	4	9
Seward			1		
Warren	2		1	12	1
Waynoka			3	2	12
White Eagle				6	3
Whitehead					2
Woodward	9		21	38	38
Total	395	57	339	913	443

CHICAGO, ROCK ISLAND AND PACIFIC RAILWAY COMPANY.

Number of carloads of live stock, grain, castor beans, cotton seed, hay, melons, flour and other mill stuff, and number of bales of cotton, forwarded from stations in Oklahoma Territory to all points outside of Oklahoma Territory, for year ending June 30, 1899.

Commodities.	Carloads.	Commodities.	Carloads.
Cattle	433	Cotton seed	44
Hogs	858	Hay	33
Sheep	7	Melons	19
Horses	23	Flour	893
Wheat	9,599	Other mill stuff	363
Corn	236	Cotton (bales)	3,843
Castor beans	20		

Carloads of farm implements, machinery, vehicles of all kinds, emigrants' movables, flour and coal, received at stations in Oklahoma Territory for the year ending June 30, 1899.

Commodities.	Carloads.
Implements	192
Vehicles	73
Machinery	145
Flour	10
Emigrants' movables	277
Coal	1,785
Total	2,482

HUTCHINSON AND SOUTHERN RAILROAD COMPANY.

Carload shipments of commodities forwarded from and received at stations in Oklahoma Territory for the year ending June 30, 1899.

FORWARDED.

From—	Cattle.	Hogs.	Wheat.	Corn.	Hay.	Flour.	Other mill stuff.	Total.
Manchester	92	31	198	82	1			404
Wakita	16	23	145	20	3			207
Clyde	16		60	25	21			122
Medford			20	6		7	4	37
Deer Creek	22	51	169	45	8			295
Nardin	16	12	322	19				369
Blackwell	28	32	843	2	1			906
Total	190	149	1,757	199	34	7	4	2,340

RECEIVED.

At—	Implements.	Vehicles.	Household goods.	Coal.	Flour.	Total.
Manchester	6		2	84	14	106
Wakita	2		1	51		54
Clyde				5		5
Medford	2		2			4
Deer Creek	12		10	55		77
Nardin	2		3	58	6	69
Blackwell	40	10	27	337	45	459
Total	64	10	45	590	65	774

CHOCTAW, OKLAHOMA AND GULF RAILROAD COMPANY.

Shipments out of the Territory for the year ending June 30, 1899.

	Carloads.
Cattle	1,864
Hogs	146
Wheat	1,075
Corn	112
Oats	181
Cotton seed	271
Hay and other grain	122
Cotton (bales)	58,800
Flour	493
Other mill stuff	515

TELEGRAPH AND TELEPHONE.

Every town on a railway in Oklahoma has complete and adequate telegraph service by the Western Union Telegraph Company, who also transmit messages to interior points via the telephone systems.

The principal towns have city offices, presided over by courteous and capable managers.

The Missouri and Kansas Telephone Company has first-class city exchanges at Guthrie, Oklahoma City, Norman, and El Reno, while their long-distance lines connect Guthrie, Oklahoma City, Norman, Purcell, El Reno, Kingfisher, Perry, Ponca, Chandler, Stroud, and all intermediate points.

Independent exchanges have been put in at Perry, Stillwater, and Shawnee, and long-distance lines connect Guthrie with Stillwater, Perkins, Pawnee, Perry, Shawnee, and other points; Oklahoma City

with Shawnee, Tecumseh, and Wellston; El Reno with Geary, Weatherford, Arapahoe, and Watonga; Mangum with Quannah, Tex.; and Blackwell, Ponca, and Newkirk with Arkansas City and Wichita, Kans.

Other lines are building between different towns, and a company has organized to connect the cattle ranches of Beaver, Woodward, and Day counties by telephone with each other and with railroad and telegraph points.

CLIMATE.

On the whole the climate of Oklahoma will compare favorably with that of any portion of the Union. True, we have in winter some severe blizzards, in summer occasional days of great heat and now and then a disagreeable sand or dust storm but the few bad days are followed by others so perfect and serene that the bad are soon forgotten. The extremes of heat and cold are not so great here as in many parts of the United States, and the average temperature is very pleasant. Though the rainfall is adequate during almost every year, the number of cloudy days is very small.

The winters are short and mild, the fall and spring seasons of pleasure and delight. Though the summer days are hot, the nights are cool, producing refreshing sleep, and constant breezes temper the heat of the sun.

The small amount of humidity in the atmosphere, the small number of rainy or cloudy days, the absence of great extremes, the cool nights and almost constant breezes, make of Oklahoma a desirable place of residence for invalids and those afflicted with lung troubles and rheumatism. Many cases of cure or great improvement have been reported among invalids from the North and East from the influence of climate alone, and the strong salt waters of the Cimarron and Salt Fork rivers have been found as invigorating and health giving as sea or mineral baths.

METEOROLOGICAL.

Temperature.—The mean annual temperature for the southern part of the Territory is about 59° F. A record of 100° or more may be expected in most parts of the Territory at some time every year—from June to September. In 1898 the hottest days were in the early part of October. Zero or a little below is indicated almost every winter in the northern part of the Territory. The coldest weather recorded was that of February 11–12, 1899, at which time the thermometer showed from —15° to —25°. The relatively low humidity makes the high temperature less oppressive.

Rainfall.—The average annual rainfall east of 97° 30′ longitude is probably 31 inches for Oklahoma proper. In the Indian Territory it is much greater. The average west of this meridian is less than 30 inches; probably not more than 28 inches.

Especially in the summer there are occasional excessively heavy rains, which make a good showing in total for year, but are much less desirable than more frequent moderate rains. The heaviest rainfall is usually in May, June, and July; often good rains in March and April. The lightest rainfalls are in the winter months, or from October to February, inclusive, except that December usually has more rain than either of the other months in this period.

There are great variations in the rainfall of different years. The years 1892 and 1898 had heaviest rainfall since the opening of the Ter-

ritory. The years 1894 and 1896 had less than the usual rainfall. The rainfall at the Stillwater experiment station in 1898 was about 11 inches more than in 1897; at Oklahoma City over 7 inches less; at Fort Sill, 11 less; at Mangum, 8.5 less.

Winds.—The prevailing winds are from the south. In 1898 the average velocity at Oklahoma City was 10.6 miles per hour; greatest velocity in March and least in August.

Frosts.—In 1897 the last "killing frost" reported varied from March 23 to April 16; in 1898 from April 6 to April 14, except at Fort Reno, where frost was reported May 2. The first fall "killing frost" in 1897 occurred from October 29 to November 2; in 1898, from October 16 to October 22, except at Waukomis, where frost was not reported until October 28.

J. I. Widmeyer, section director at Oklahoma City for the climate and crop service of the United States Weather Bureau, has furnished us with much of the above information and compiled the tables which follow. Other information on the meteorological conditions of the Territory is furnished by the Agricultural Experiment Station at Stillwater.

Total monthly and annual precipitation.

OKLAHOMA CITY.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1891	2.48	0.44	3.04	4.80	5.92	4.73	6.17	0.79	5.43	0.31	1.17	2.65	37.43
1892	0.93	2.22	3.17	1.33	11.90	2.48	3.66	4.27	1.09	4.68	1.01	5.35	42.29
1893	0.43	0.69	1.25	3.12	1.53	1.60	3.80	5.65	3.20	0.06	1.26	1.69	24.28
1894	3.74	1.11	4.79	2.82	1.87	3.71	1.66	1.95	1.65	1.84	0.07	1.51	27.72
1895	0.93	0.07	0.82	0.41	1.34	3.11	5.94	4.44	2.93	2.93	5.79	3.78	32.49
1896	0.45	0.14	1.08	1.02	4.62	3.32	1.81	1.83	2.14	1.91	2.41	1.22	21.90
1897	1.10	1.32	4.71	5.87	6.02	2.58	1.90	1.66	1.32	0.71	0.58	0.70	28.47
1898	4.38	2.37	2.34	0.95	9.96	1.75	4.06	2.82	1.72	2.08	0.91	2.54	35.88
Average	1.80	1.04	2.64	2.48	5.40	2.91	3.62	2.93	2.45	1.83	1.65	2.43	31.18

TULSA, CREEK NATION.

1889	3.54	0.25	4.00	0.96	3.28	2.20	2.80	0.80	3.85	2.05	2.55	0.00	26.28
1890	2.35	1.25	0.80	4.70	3.70	0.35	1.15	9.30	3.35	3.35	1.75	1.10	34.15
1891	1.00	1.05	2.05	5.15	5.00	3.20	3.15	0.70	0.65	0.55	1.30	1.00	24.80
1892	0.50	0.75	4.45	3.10	12.10	6.26	2.00	4.80	1.30	5.90	1.00	4.00	46.16
1893	1.36	1.25	1.55	7.61	7.65	5.90	0.35	3.45	2.20	1.00	1.70	0.10	34.12
1894	1.64	1.00	3.00	4.80	4.30	1.60	2.65	1.20	2.15	2.85	0.60	1.30	27.09
1895	1.20	0.00	1.10	3.05	3.20	5.70	10.30	2.82	1.90	1.60	5.80	7.90	44.57
1896	0.50	0.30	1.30	1.60	5.90	4.10	0.60	0.00	1.50	4.00	2.50	0.90	23.80
1897	2.40	0.97	6.70	5.60	0.80	2.20	3.72	4.24	0.00	1.22	1.29	1.08	30.22
1898	4.62	2.85	5.71	1.65	8.40	5.64	7.95	1.71	4.42	4.00	1.53	3.81	52.29
Average	1.91	0.97	3.07	3.82	5.43	3.76	3.47	2.88	2.13	2.76	2.00	2.12	34.35

FORT SILL, OKLA.

1889	2.71	0.87	1.63	1.90	3.52	4.25	1.81	3.82	4.69	2.61	1.48	0.00	29.29
1890	1.73	0.46	0.31	8.77	4.58	0.22	0.44	3.00	2.17	4.17	4.06	0.63	31.08
1891	3.80	0.12	2.66	4.99	3.56	4.96	6.25	1.10	1.05	0.36	1.10	2.72	32.76
1892	0.51	1.23	2.05	2.56	7.20	2.60	1.52	4.06	3.57	5.69	0.35	2.98	34.32
1893	2.95	1.17	1.36	0.37	3.50	0.51	1.91	4.70	3.65	0.00	1.30	2.77	24.19
1894	1.70	0.72	2.32	4.08	4.20	1.04	1.91	2.47	3.45	1.09	0.00	0.65	24.08
1895	0.56	0.54	0.20	0.43	2.92	3.92	6.28	2.10	0.06	4.59	5.56	2.01	29.17
1896	1.40	0.41	1.23	1.63	1.26	1.38	1.21	1.66	0.81	1.55	1.83	2.75	17.12
1897	1.50	0.39	2.62	0.80	8.07	2.80	1.95	2.37	1.75	2.73	0.49	0.82	26.29
1898	1.69	2.20	3.24	5.86	6.53	4.00	2.20	4.50	2.07	1.66	1.00	2.40	37.35
Average	1.86	0.81	1.81	3.13	4.54	2.57	2.55	2.98	2.33	2.50	1.72	1.77	28.56

Total monthly and annual precipitation—Continued.

FORT SUPPLY, OKLA.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885	0.38	0.74	1.48	3.60	7.56	5.44	4.17	0.62	3.41	1.00	1.07	3.19	37.66
1886	0.76	0.40	0.34	1.73	0.06	3.54	0.98	0.92	0.20	1.32	0.10	0.00	10.35
1887	0.00	0.00	0.00	1.64	2.37	2.96	1.06	2.98	2.24	0.56	0.30	0.64	14.75
1888	0.30	0.82	0.18	4.42	2.72	0.84	1.18	2.30	1.20	0.90	0.38	0.26	15.50
1889	0.90	0.10	2.11	1.33	2.29	2.90	2.17	3.45	2.02	4.99	1.35	0.00	23.61
1890	1.80	0.18	0.00	2.98	2.21	2.37	1.74	3.33	1.29	0.74	1.53	0.09	18.26
1891	2.67	0.60	2.89	0.28	3.75	4.85	8.12	0.90	1.52	2.33	1.21	1.81	30.43
1892	Tr	2.02	3.02	0.55	4.48	0.65	1.55	4.52	1.15	1.85	0.40	1.80	21.99
1893	0.02	0.62	0.20	0.25	1.43	0.74	1.60	4.37	2.72	0.00	0.70	0.50	13.35
1894	0.25	1.04	0.12	4.36	5.22	1.31	2.63	0.26	2.29	0.49	0.25	.....	.....
Average	0.71	0.65	1.08	2.61	3.21	2.56	2.52	2.36	1.80	1.42	0.73	0.78	18.57

STILLWATER, OKLA.

1895	.....	.....	.....	.....	2.27	5.08	3.60	4.97	1.50	1.59	4.69	3.38	.....
1896	0.55	0.19	1.21	0.94	5.93	7.26	5.85	1.04	2.54	2.88	1.56	1.05	30.80
1897	0.81	1.51	3.51	6.30	4.77	4.13	2.63	4.51	0.71	0.97	0.80	0.87	31.52
1898	3.53	3.00	2.75	0.58	8.56	4.72	6.35	2.86	2.72	4.19	0.68	2.68	42.62
Average	1.68	1.57	2.49	2.61	5.38	5.30	4.61	3.34	1.89	2.41	1.93	1.95	34.98

CLIFTON, OKLA.

1894	3.35	1.45	3.12	4.78	2.42	1.08	1.08	0.35	1.81	1.12	0.50	1.23	22.29
1895	1.41	0.27	0.90	0.84	0.67	10.32	4.61	5.90	0.13	2.77	5.53	4.84	38.19
1896	0.77	0.23	0.95	0.69	2.01	3.12	1.96	1.96	2.51	1.21	3.31	0.71	19.43
1897	1.19	1.25	4.82	9.22	3.61	2.64	3.63	2.73	0.60	1.26	0.77	0.97	32.09
1898	4.17	2.57	4.36	1.26	10.64	2.96	2.74	2.82	0.78	2.79	0.90	2.76	36.75
Average	2.18	1.15	2.83	3.36	3.87	4.02	2.80	2.75	1.17	1.83	2.20	2.20	30.17

ARAPAHO, OKLA.

1894	0.78	0.50	0.88	4.87	2.01	4.82	2.22	0.90	2.52	1.59	fT	0.38	21.47
1895	1.01	2.09	0.06	1.35	1.74	5.90	5.08	5.46	1.15	2.84	3.10	1.25	30.05
1896	1.51	0.22	0.86	1.70	1.60	5.04	4.77	1.26	2.36	2.37	0.65	2.85	25.19
1897	1.56	0.46	1.71	4.22	8.80	2.85	1.74	1.65	2.30	0.99	0.18	0.23	26.69
1898	0.94	2.62	1.79	1.39	6.43	5.60	9.82	1.22	1.97	0.79	0.98	2.09	35.04
Average	1.16	1.18	1.06	2.71	4.12	4.84	4.73	2.10	2.06	1.72	0.98	1.36	28.00

WINNVIEW, OKLA.

1893	.....	2.19	0.98	1.82	2.24	3.73	2.90	7.31	1.44	T.	1.45	1.80	25.86
1894	1.40	0.70	1.68	6.05	3.37	1.35	2.44	0.85	3.28	1.33	T.	0.53	22.98
1895	1.19	1.02	0.02	0.89	2.79	4.31	2.83	5.71	0.86	1.83	3.17	1.57	26.19
1896	2.10	0.08	0.67	0.99	9.71	3.71	6.14	1.33	2.46	1.96	0.41	1.26	21.73
1897	1.53	0.81	2.29	4.49	7.42	2.33	1.54	1.08	2.25	2.36	0.03	0.42	20.55
1898	2.01	3.55	1.56	1.08	13.38	2.88	6.90	2.58	1.13	1.63	0.88	2.05	39.63
Average	1.65	1.39	1.20	2.55	4.98	3.05	3.79	3.14	1.90	1.52	0.99	1.44	26.15

JEFFERSON, OKLA.

1894	1.74	1.03	0.22	4.02	2.15	0.61	1.11	2.16	2.22	2.05	0.08	0.30	17.69
1895	0.98	0.49	0.05	0.62	1.18	6.36	4.17	3.27	0.34	0.76	0.90	1.35	21.56
1896	0.65	0.20	0.86	1.25	1.00	4.76	5.69	0.72	4.17	5.85	0.38	0.48	26.01
1897	0.91	1.02	2.65	5.80	4.96	5.15	1.15	5.48	1.36	0.72	0.00	0.50	29.70
1898	2.32	2.55	1.43	1.61	7.53	7.42	3.27	6.40	1.27	1.25	0.65	2.84	38.54
Average	1.32	1.06	1.04	2.66	3.36	4.88	3.08	3.61	1.87	2.13	0.62	1.09	26.70

Total monthly and annual precipitation—Continued.

MANGUM, OKLA.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1893	0.25	0.81	0.55	0.33	1.55	1.34	0.97	3.12	1.62	0.08	0.10	0.67	11.39
1894	1.01	1.21	0.62	2.98	2.94	2.44	0.93	3.25	1.45	2.51	0.00	0.18	19.52
1895	0.40	3.07	0.00	0.69	1.14	11.54	6.33	2.82	Tr	3.72	2.26	0.93	32.80
1896	1.67	0.90	0.10	1.75	1.76	3.38	4.97	0.95	1.34	1.87	0.61	3.55	22.85
1897	1.82	0.26	1.48	2.72	3.52	3.23	2.28	2.91	2.78	0.92	0.36	0.21	22.49
1898	1.36	3.38	1.32	1.12	5.17	7.79	2.62	3.41	1.45	0.60	0.55	2.14	30.91
Average	1.08	1.60	0.68	1.60	2.68	4.95	3.02	2.74	1.44	0.62	0.65	1.28	23.34

Monthly and annual mean temperatures.

OKLAHOMA CITY.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1891	37.8	39.2	43.6	60.8	64.4	74.3	76.2	76.8	72.4	60.8	47.0	44.4	58.1
1892	33.0	44.2	44.6	59.2	66.2	75.1	79.0	77.0	72.4	62.0	48.0	35.6	58.0
1893	37.6	35.8	50.2	62.4	65.4	76.2	81.2	75.2	74.4	61.7	45.4	43.7	59.1
1894	36.8	34.8	52.6	62.9	68.2	75.4	79.4	78.4	74.4	64.0	49.8	41.6	59.9
1895	33.2	29.5	50.0	63.1	69.3	76.8	78.3	79.1	76.1	55.7	45.0	38.4	57.9
1896	39.4	43.4	46.4	66.1	73.3	76.2	80.7	83.2	71.6	59.2	46.6	45.0	61.0
1897	34.8	42.1	50.4	59.6	65.8	75.4	80.8	78.4	75.2	66.0	48.6	35.6	59.4
1898	40.4	44.1	49.4	57.8	68.2	76.8	78.3	78.2	74.1	60.1	46.0	35.1	59.0
Average	36.6	39.1	48.4	61.5	67.6	75.8	79.2	78.3	73.9	61.2	47.0	39.9	59.0

STILLWATER, OKLA.

1895	.....	.....	.....	.....	69.0	77.0	78.4	79.7	75.9	54.9	45.9	38.0	.....
1896	39.5	43.7	46.3	66.8	73.9	74.7	80.0	82.7	72.0	59.2	46.6	43.4	60.7
1897	33.7	41.4	51.0	58.0	65.4	75.7	81.1	77.3	74.1	64.6	47.0	32.1	58.4
1898	37.9	43.5	49.8	58.3	64.5	76.9	78.9	77.8	74.5	60.2	46.0	36.0	58.6
Average	31.0	42.9	49.0	60.9	68.2	76.1	79.6	79.4	74.1	59.7	46.4	37.4	59.2

RAINFALL 1899.

The rainfall for the first seven month of 1899 at Oklahoma City was as follows:

	Inches.
January	0.78
February	0.48
March	0.90
April	4.81
May	9.63
June	4.91
July	6.17
Total	27.68

SUNSHINE 1899.

Month.	Actual hours.	Possible hours.
January	171.0	314.6
February	233.3	305.8
March	184.3	372.1
April	258.6	392.7
May	311.6	434.2
June	358.8	434.3
July	389.9	442.0
August	378.2	417.1
September	306.7	372.0
October	282.6	350.1
November	217.6	310.1
December	206.1	305.2
Total	3,298.7	4,480.2

Per cent of sunshine for the year, 74.

STORMS.

Severe storms are of rare occurrence in Oklahoma. The blizzards of winter are disagreeable but seldom severe enough to endanger the life of persons out in them, thunderstorms are few and not severe and cyclones visit the Territory no oftener than any of the North, Central, or Atlantic Coast States. Through the instrumentality of sensational newspaper correspondents and people with ignorant but prejudiced minds, the impression has obtained that Oklahoma is the home of the cyclone and the tornado, and within a few months such generally reliable journals as the Scientific American and Leslie's Weekly displayed unusual credulity by giving credence to a report of cyclones being bombarded with captured Spanish cannon and broken up at Hennessey, Okla., and commented upon and discussed the same at great length. Such stuff as this causes the Western people to lose faith in the reputed intelligence of the East.

Oklahoma has not been visited by a severe storm of any kind for over two years, and in the ten years of her existence the records of the Government Weather Bureau Service will show that her cyclones or other storms have been fewer in number than those of Iowa, Missouri, Ohio, Minnesota, Illinois, Indiana, Kentucky, New York, or a half dozen other States, and cyclones have killed many more people and ruined manifold more property in each of these States than in Oklahoma.

Yet the people of Oklahoma do not call these States the home of the cyclone and sit up nights worrying over the danger to their friends and relatives living there.

AGRICULTURAL EXPERIMENT STATION.

This institution has been of increasing value to the agricultural interests of the Territory. Located at Stillwater and conducted in connection with the Agricultural and Mechanical College it is doing a work of great value to the farmers of Oklahoma in determining the best fruits, grains, and other products for this country.

During the past year it has published and distributed eight bulletins reporting the results of completed experiments and has compiled and issued a report of 96 pages summarizing the results of the work of the station since it was established. These publications are printed in editions of 15,000 and prove of great interest and benefit to the people.

The station is conducting experiments along many lines with the constant purpose of making them thoroughly practical without losing in the least degree their scientific accuracy and value. Members of the staff attend farmers' institutes throughout the Territory and in every way do their utmost to advance the cause of agricultural education.

AGRICULTURE.

In fertility of native soil, in equable temperature, in well-distributed rainfall, in facility of tilling the land, and harvesting and marketing crops; in freedom from scourges, of droughts, insects, hot winds, and blizzards; in cheapness of land—in fact, in all resources and conditions which unite to promote and maintain a prosperous and successful agriculture, Oklahoma is unsurpassed, and, taken all in all, is indeed unequaled by any section of similar area in the United States.

The soil is of remarkable fertility, and ranges in depth from 2 to

20 feet. It will need no costly fertilizers even in the coming generations, providing the renovating crops, cowpeas and red and crimson clover, which thrive well here, are used judiciously in crop rotation.

The farmers of the Atlantic States pay annually for commercial fertilizers the princely sum of $40,000,000. This is essentially an annual tax levied upon the agriculture of that section, in return for which the farmers do not get as large crops as those of Oklahoma, who are exempt from this burden.

THE FARMER LEADS.

Oklahoma is to-day the most prosperous section of the United States, and the Oklahoma farmer is the leading factor in this prosperity.

While our cities and towns have grown and prospered and manufacturing establishments are factors in their development, yet, upon the farmer, the tiller of the soil and the grower of live stock, depends much the greater portion of the business energy of the commonwealth.

The handling of what he produces and what he uses and consumes gives much of his occupation to the dweller in the towns or the cities of the Territory.

The farmer has converted the raw prairie into fields of grain, orchards of fruit, and gardens of vegetables; his home dots the landscape, his cattle and his sheep cover the hills, his swine run the timber, his horses and mules line the highway conveying to market the products of the land which has been made to bloom as the rose.

In no other part of the continent are the farmers so generally prosperous and successful as in Oklahoma. They are building commodious barns and fine houses, riding in new carriages, improving their farms in various ways, purchasing more and better live stock, providing their families with comforts and luxuries, sending their sons and daughters away to school, taking pleasure trips to their old homes in the States, putting money in the bank, and enjoying life generally.

The true story of the success of many farmers in Oklahoma reads almost like fiction.

The success of Thomas Standard is a very good example of what can be done in Oklahoma, says the Okarche Times of recent issue:

> He came here four years ago with practically nothing in the way of capital, skirmished around a little, finally got his family here, went in debt for teams, seed, feed, and everything else, but he and the four boys also went to work. They bought a piece of land on time, the first crop was not of much account and they continued "on time."
>
> Mr. Standard engaged in buying wheat in Okarche, and the boys ran the farm and picked up any outside work that came along. They have all worked together with a wonderful unanimity, and now have four quarter sections of as good land as Oklahoma affords, a full line of machinery, including a steam thrasher, teams, stock, a half interest in a hardware business, and are in good shape for the future. This year they have a fine crop of over 400 acres of wheat, a large field of corn equal to any grown in Illinois or any other corn State, and are now negotiating for another fine quarter section of land. Good management, plenty of grit, and hard work will make money for anyone in Oklahoma.

This is but one of hundreds of similar cases—men alone or with families coming to the Territory without a dollar and in eight or ten years securing a competence for a life of comfort.

CLIMATIC CONDITIONS.

The class of farming to be selected in different portions of Oklahoma depends more on the annual rainfall and its distribution than on soil or other conditions, unless market facilities be an exception.

There is poor soil in the Territory, but the great mass of the soil of Oklahoma is at least fairly fertile, given a sufficient supply of moisture. Hot winds sometimes cause much loss to crops, but these would be much less severe if the soil had abundance of water. Bottom or irrigated lands suffer relatively little from such winds.

The meteorological conditions have been studied long enough to make it safe to form some general conclusions, although there are considerable differences in the rainfall between series of years as well as between different years in any series. The distribution of the rainfall through the year is almost as important as is the total for the year.

Under the direction of army officers, the rainfall and temperature records have been kept at several forts in Oklahoma and the Indian Territory for a period longer than that since the opening of Oklahoma to settlement. Since 1890 the United States Weather Bureau has had a central observing point at Oklahoma City, to which reports are made from a considerable number of points by voluntary observers. The records at the Stillwater Experiment Station are not complete prior to May, 1895.

As in the States north and south of Oklahoma, the general rule is that the rainfall decreases from east to west and with increased elevation. The evidence is conclusive that eastern Oklahoma has sufficient rainfall so distributed throughout the year to make the cultivation of most ordinary farm crops reasonably safe, except on high, sloping uplands. It is equally well settled that extreme western Oklahoma is best adapted to grazing purposes, that the soil there had best be left in the natural grass crop, unless irrigation is practicable, or in case of some creek or river bottom land.

There is a middle section, the boundary lines of which can not be exactly stated, the fitness or unfitness of which for farm crops can not be stated with equal positiveness. In this section there is most danger of settlers making costly mistakes. The experience of farmers in Texas, Kansas, Nebraska, and the Dakotas may be studied with profit. There is no good reason for expecting any greatly marked variation in the average rainfall in regions with the same longitude and elevation north or south of Oklahoma.

Of cultivated grain crops Kafir and sorghum are safer for uplands in the eastern part of the Territory and for all lands not irrigated west of 98°. Wheat will do well with much less rain than is necessary for corn, as it does not continue its growth through the extremely hot weather. Cotton is quite as subject to injury from excessive rains or wet weather as from moderate drought. Alfalfa is a safer crop than any of the true clovers or the grasses usually cultivated farther north and east. Bermuda grass thrives well in the eastern half of the Territory at least. Bromus inermis and the so-called English blue grass give promise of fair success. Orchard grass seems to offer better promise than timothy, redtop, blue grass, etc. The millets do well generally. Cowpeas, soy beans, peanuts, sweet potatoes, melons, and turnips often produce large crops with comparatively little cultivation.

Fruit trees make a phenominally rapid growth in eastern Oklahoma. The indications are that much of Oklahoma will prove to be well adapted for growth of apples, peaches, plums, grapes, blackberries, and reasonably well suited for strawberry culture.

Further information as to rainfall, temperature, frosts, winds, etc., are given under the head of climate.

FIVE-YEAR-OLD APRICOT ORCHARD.

JAPANESE PLUMS IN BLOOM, THREE YEARS FROM PLANTING.

OKLAHOMA LEADS.

Under this caption a recent Associated Press dispatch from Chicago appeared in all of the leading papers of the nation. The dispatch is as follows:

Chicago, July 18.—The report of Charles D. Snow & Co. shows that Oklahoma leads in wheat and oats yield and in the condition of corn. The Snow circular says: "Herewith we submit the result of more than 1,500 inquiries, as indicated below, returned by our correspondents throughout 15 States. The figures will bear careful study, as they are the latest information, and we believe they are reliable."

Then follows the following table:

State.	Average yield of wheat.	Average yield of oats.
	Bushels.	*Bushels.*
Michigan	7.5	33
Indiana	11.3	25
Ohio	17.5	35
Kentucky	11.7	21
Tennessee	9.6	12
Missouri	10.6	35
Oklahoma	20	55
Wisconsin	16	40
Illinois	10.4	42
Iowa	10	38
Kansas	10.9	32
Nebraska	11.7	37
Minnesota	16.4	40
North Dakota	13	40
South Dakota	10	32

In condition of the corn crop Snow & Co. place Oklahoma in the lead, with a crop in perfect condition.

CROP CONDITIONS AND PROSPECTS.

The report of the Oklahoma section of climate and crop service of the Weather Bureau for June, 1899, gives very reliably the condition and prospects of the crops for the year, and is as follows:

Synopsis of climate and crops during month of June.

THE WEATHER.

A very even and nearly normal temperature prevailed during the entire month. Neither abnormal heat nor cold was registered. Average temperature, 74°. The rainfall was everywhere above normal. Rain nearly every day until the 16th. From the 17th until the close of the month, except a few scattered, light, local showers, there was no precipitation. Cloudy or partly cloudy until the 16th; almost cloudless sky on and after the 17th. The rainfall for the month was 4.91 inches.

THE CROPS.

Wheat at the beginning of the month was generally in fine condition and continued thus until all was in shock, stack, or thrashed. Harvesting began on the 12th, but on account of much rain and wet ground was not general until the 18th. The bulk of the crop was harvested from the 18th to the 27th. Only in the west and northwest were there fields of late wheat uncut at the close of the month. Some thrashing has been done, and the yield has been generally good and the quality fine, especially early wheat. Neither yield nor quality of late wheat compare favorably with the early. As thrashing advances, it was found that both the quantity was lessened and quality lowered by rust much more than was thought. Judging by that which has already been thrashed, the crop, as a whole, is very good—above the average—and only excelled by the crop of 1897.

Oats.—A fair average crop of oats ripened and was cut during the last week of the month.

The weather during the entire month was favorable for the growth of corn, but during the first half rain and wet ground prevented its being properly cultivated; during the last half of the month conditions were favorable for working the crop, and at the close of the month the late corn had received its last cultivation and laid by. Early corn is generally in silk and tassel. In the South much of it is in the roasting-ear stage, some few fields already matured, and all give promise of a large yield; the ground is now getting dry, and while not yet suffering from the lack of moisture, yet a general heavy rain would be of great benefit, and almost insure the early portion of the crop.

Cotton did poorly during the first two decades of the month—too much rain and cloudy weather; weeds got a big start, and when the ground got sufficiently dry to cultivate the crop, some fields were so foul with weeds and grass that they were abandoned. The crop generally did well during the last decade of the month, and although hardly in normal condition, is rapidly improving. In the Chickasaw and Choctaw nations and in Greer County the plants are forming an abundance of squares and considerable bloom. Elsewhere throughout the cotton-producing districts the plants are branching and lower squares are forming. Web worms did slight damage during the early part of the month, but these all disappeared during the latter part, and at the close of the month no pests are hurting the plants.

Hay.—Grass has been in perfect condition during the entire month, and a very large crop of fine hay is being made. Two crops of alfalfa have been cut, and much native grass harvested. This work with favorable conditions will continue during July and August.

Potatoes.—The first crop of Irish potatoes has been dug and generally yielded a full crop. The second crop is now being planted. Sweet potatoes are making a fine growth and look very promising.

Minor crops.—Castor beans, Kaffir corn, millet, peanuts, and broom corn are all doing well. Small fruit and vegetables have been abundant.

Fruits.—Early peaches ripened during last decade of the month. The quality of the crop was very fine, and quantity larger than expected. Late peaches are doing well. There was but a light crop of cherries and plums. Apples give promise of fair yield. Grapes are unusually promising, the vineyards being loaded with young fruit; during the third week of the month bird's-eye rot appeared on some varieties and threatened much danger, but during the last week this rot did no further hurt, and has about disappeared.

Watermelon and cantaloupe vines are well filled with fruit, which is rapidly approaching maturity.

Farmers are now busily engaged in stacking and thrashing wheat and oats, making hay, and cultivating late cotton.

The following dispatch in a number of metropolitan papers recently depicts in glowing but truthful colors the present condition and prospects of Oklahoma and her people:

WORLD'S GARDEN SPOT.

The persistent claim of Oklahoma that the Territory is the garden spot of the world will be no idle boast this year. Present indications point to an unusually large wheat crop, and fruits are already bearing in large quantities. The fears formerly expressed that the long and severe winter would injure fruit and grains are no longer felt, and the excellent condition of the products is a subject of comment by all travelers through the Territory. The products of Oklahoma are varied. In her production of wheat and corn the Territory rivals the greatest producing States of the Union, while it is furnishing fruits which formerly were imported from California and Florida. Now, Oklahoma ranks as one of the finest fruit-growing sections of the continent. Strawberries of a more than ordinary luscious variety were produced this year. Reports from all sections show that peaches, pears, apples, and plums are in good condition, and grape prospects are more flattering than ever before. The peach crop will be unusually fine, although the amount on each tree is less than the full crop. Wheat, oats, and alfalfa were never finer, and recent showers have benefited the crops greatly. Glowing reports are brought from Kay and other counties in the strip, which already have earned a great reputation in the production of grains. Other portions of the Territory are not backward, however, in their yield. Estimates as to the comparative production of wheat to the acre are not generally indulged in, but all indications point to a generous yield. The acreage of cotton is smaller this year than some previous years, low prices having discouraged producers to some extent. The

HARVESTING WHEAT IN PONCA INDIAN RESERVATION.

exports of cotton to foreign markets, as well as the great possibilities opened up by the mills and compresses, make the industry an important one. The outlook for cotton is good. All in all the prospects for this year are good. Oklahoma will verily flow with milk and honey and sustain the reputation as "God's country," which its residents believe it to be.

WHEAT GROWING.

The leading crop which the Territory markets is wheat. Oklahoma produced this year 20,000,000 bushels of this grain, which at this time has all been harvested, much of it thrashed, and a considerable quantity of it marketed.

Wheat growing certainly pays in Oklahoma. Upon single quarter sections of Oklahoma land, that five years ago were raw prairie, from 2,000 to 2,500 bushels of wheat that tested from 60 to 62 pounds to the bushel were raised last year, and this at a minimum expense. Men have rented school quarters at $50 per year, and raised as high as 2,500 bushels, having no money invested in the land and no taxes to pay.

Kay County is the leading wheat county of the Territory, and it is estimated that the crop of that county reached 3,500,000 bushels this year, though it was cut short somewhat by excessive rain just as the grain was heading.

There was a single wheat field of 5,000 acres in the southern part of the county which yielded about 90,000 bushels this year, and the same man will sow 8,000 acres next fall.

The unusual cold weather of the winter, the wet weather of spring, and the mistake of late planting combined to make the yield per acre small in some localities, many farms running but 8, 10, or 12 bushels per acre, but there were just as many that ran from 25 to 40 and occasional yields well up toward 50 bushels per acre, and the general average for the Territory was undoubtedly in excess of 20 bushels per acre.

In a recent summary of the year's work at the agricultural experiment station at Stillwater the following report was made of the wheat experiments:

The tests were made, as in previous years, on the medium upland prairie soil of the station farm, the same tracts being used as in 1897–98. The land on which the variety tests were conducted had been manured in the winter of 1895, and had the roots and stubble of a crop of cowpeas plowed under in September, 1898. Except where otherwise stated the other experiment plats had been manured in the summer of 1898, at the rate of about 16 tons coarse stable manure per acre.

Varieties.—Thirteen varieties, with one or two exceptions grown on the farm for the last four years, were used in the variety test, having been selected from a much larger list as being most promising. The seed used was that of the crop of 1898, and was of light weight. All the plats were sown at rate of 5 pecks per acre, September 19 or 21, except Turkey, which was sown September 29. The land was plowed September 10 after crop of cowpeas following wheat had been removed. The seeding was done with a press drill, rows 6 inches apart. The wheat came up well in six days. The first heads appeared from May 7 to 11. The wheat was cut June 12—except Turkey. The wheat was thrashed June 22.

Three plats each of Fulcaster and Red Russian were sown as check plats. There was a difference of 4 bushels in the yields of these plats. The average yield of the three of Fulcaster was 25.8 bushels, the Red Russian. 23.3 bushels. These averages are taken for these two varieties.

The average yield of the 13 varieties was 22.6 bushels. Only the Turkey yielded less than 20 bushels per acre. The 5 varieties giving largest yields were: German Emperor, Fulcaster, Sibley's New Golden, Red Russian, and Early Ripe. The average weight per bushel was about 59 pounds, varying from 58 to 60 pounds. The straw varied in height from 38 to 43 inches, and, as cut, from 1,870 to 3,333 pounds per acre. All varieties stood up well.

The yields of the different varieties, yields of straw per acre, also the average yields for last four years for the varieties tested during this time are given in table.

Varieties.	Grain, 1899.	Straw, 1899.	Grain, 1896-1899
	Bushels.	*Pounds.*	*Bushels.*
German Emperor	27.9	3,333	28.6
Sibley's New Golden	27.2	2,332	30.7
Fulcaster	25.8	2,339	27.7
Early Ripe	23.8	2,365	26.9
Red Russian	23.3	2,416	27.3
New Red Wonder	23.1	1,969	.....
Nigger	22.9	2,365	29.8
Fultz	22.9	2,035	26.6
Missouri Blue Stem	21.1	2,100	30.3
Early Red Clawson	21.1	1,870	29.1
Pickaway	20.3	2,079	28.4
Big English	20	2,101	28.8
Turkey	14.7	1,738	.....
Average	22.8	2,334	28.5

A. Darroch, of Red Rock, reports that his crop of 130 acres of wheat averaged 20 bushels to the acre, and the berry is fine and plump and will test fully 60 pounds to the bushel. Mr. Darroch is a practical farmer, and says that from his experience Oklahoma leads the country as a wheat producer.

One of the best yields reported was that of H. C. Swingle, who lives near White Rock. Mr. Swingle had 11 acres of wheat which averaged 40 bushels per acre, and 46 acres which averaged 29 bushels and 3 pecks. This undoubtedly takes the prize for good wheat.

A. B. Whitney, west of Edmond, thrashed 1,362 bushels from 52 acres; this is almost 26¼ bushels per acre; the average would have been larger had not a small portion of the field blown out.

In Oklahoma County, William Voight thrashed from 30 acres 757½ bushels of wheat; variety Red Russian; this is an average of 25¼ bushels; the wheat tested a trifle over 60 pounds to the bushel.

D. A. Shirer, near Oklahoma City, had 80 acres that averaged 30½ bushels per acre.

A. Anderson, in Logan County, had 30 acres that ran 33 bushels per acre.

These are but few of the moderate yields reported, and many as good and better could be cited from every county.

CORN.

"And the maize filled, grew, and ripened,
'Til it stood in all the splendor
Of its garments green and yellow,
Of its tassels and its plumage;
And the maize ears, full and shining,
Gleamed from bursting sheaths of verdure."

The cornfields of Oklahoma are the admiration of all who behold. The first settlers raised excellent corn upon the raw sod, and as the ground has been mellowed and broken by continued cultivation and saturated to greater depths by the falling rains, the yield of the yellow staple has everywhere increased until it seems prodigious—almost beyond belief.

The corn crop of Oklahoma this year will certainly exceed 75,000,000 bushels; how much more it is hard to estimate, for so little of the corn is really marketed or shipped in the shape of grain.

INDIANS PICKING COTTON IN WASHITA COUNTY.

The greater portion of the corn crop of Oklahoma is driven to market on foot. The farmer feeds his crop to his own stock, or sells to the cattlemen whose great herds roam the prairies to the west, fill the great pastures of the Indian country to the east, or are shipped in to the quarantine feeding pens during the winter season.

Corn may not be king in Oklahoma, but it is at least a prince of the royal blood, flourishing freely and producing abundantly wherever the soil is stirred and the golden grain dropped beneath its inviting mantle. Many fields have had well-authenticated yields of 80, 90, and even 100 bushels per acre, and a general average in many localities of 40 bushels on upland and 50 to 60 on bottom land is very common.

At the Trans-Mississippi and International Exposition in Omaha last year Oklahoma produced the tallest stalk of corn, measuring over 19 feet in height, and the Territory expects this year to win in the competition for the tallest stalk to be sent to the Paris Exposition by the United States Government.

It was generally understood that corn was a successful crop in the eastern counties of the Territory—in the rich bottoms and the fertile semiwooded lands—but the prevalent impression has been that as a rule it did not succeed in the western portion of the Territory. A visit to the western counties during the crop season will dispel this illusion, as it does many another about the crops, rainfall, and climatic conditions there. True, there are many of the high prairie uplands in the extreme west that are alone adapted to grazing, but there is no part of the Territory where corn will not do well in the river bottoms, and a recent trip through Custer, Washita, and Blaine counties showed fields of corn as fine as those of Illinois, Indiana, or Kentucky, while down the Washita Valley, along the new extension of the Rock Island Railway west from Chickasha, was seen for many miles one great sea of waving corn, 12 feet high and still shooting upward at the top in silken tassels and outward at the sides in massive, bursting ears of milky cob, soon to be covered with golden grain.

The corn crop of these and adjacent counties has been a success for years, producing abundantly and finding a ready market at the cattle ranches near at hand.

COTTON.

The time was, even in the short history of Oklahoma, when cotton growing was unknown, and when the few enthusiasts who advocated planting the fleecy staple were hooted at as impracticable and visionary.

To-day a prominent place in the diversion of crops in Oklahoma is assigned to cotton, and it is the chief ready-money crop of the Territory. Cotton in Oklahoma produces from a half to three-fourths of a bale on the average, and in many instances runs a bale or over to the acre. The quality is of the best, the cotton of Oklahoma and the Indian Territory being rated at the top of the market. It should be grown along with a number of crops in a system of general farming rather than be relied upon as the only crop. The large amount of unpicked cotton left each season seems an evidence of some serious miscalculations in planning the crops to be grown. It is believed that it will be found profitable, as an average of a number of years, to grow not more than 10 acres of cotton to each farm, as exclusive cotton farming has not paid in the South.

The cotton crop of the Territory last year reached about 140,000 bales, bringing in the market about $5,000,000. The beauty of cotton

growing is that it brings new money into the Territory from the outside, and a large portion of the proceeds going into the hands of the pickers, is put rapidly into general circulation.

The acreage of cotton this year is about equal to that of last, and the present indications are for a fair crop.

The growing of cotton necessitates many gins, which give employment, and has also caused the erection of compresses and oil mills at a number of points, and will in time bring cotton spinning and weaving mills to the Territory, developing our manufacturing as will no other crop.

During the past year large quantities of Oklahoma cotton was shipped from the Territory direct to Liverpool, and several consignments of considerable magnitude went to far-off Japan.

KAFFIR CORN.

Kaffir corn, a native of Africa, but little known throughout the North and East, is one of the profitable crops of this country. It yields from 40 to 80 bushels of thrashed seed per acre, and makes fine feed for stock of all classes. It always produces a crop, no matter how dry the season, and can be planted any time from April to June. Planted even as late as July on ground from which a crop of wheat has been taken, it will produce a good crop of fodder, with enough grain to fatten cattle for market with no other ration.

The grain makes excellent meal and also fine flour, and as the crop is never a failure, it is a very desirable article to plant in all sections. Kaffir corn is becoming known in the markets, and Oklahoma exported many carloads to Europe the past year.

MELONS.

Oklahoma melons are favorably known in all of the markets of the middle West. The first settlers in the Territory early found that the soil produced magnificent melons, and many a settler raised a crop of them on the raw sod the first year and feasted upon them when often he had but little else. For four or five years they have been shipped out of the Territory in increasing quantities. Last year several hundred carloads of watermelons and a dozen express cars of cantaloupes were shipped to outside markets, and this year more than twice that many will be sent, arrangements having been made for the running of entire watermelon trains from the Territory.

Then, too, the number of melons consumed in the Territory is something enormous. They come into market about the Fourth of July and they stay until Thanksgiving. It is only during the first few days that the price of a watermelon stays above a dime in an Oklahoma town, and by the time the season is well on a man can get one larger than he can carry for a dime and three times as large a one as he can eat for a nickel. Later they go two and three for a nickel. Cantaloupes start in at a dime each; in a few days drop to two for a nickel, and later to a nickel a dozen.

Watermelons of 40, 50, and 60 pounds are very common. Even 70-pound ones do not excite any comment, and the Territory has produced them tipping the scales at over 100.

Oklahoma City, Waterloo, Seward, Guthrie, Lawrie, Bliss, Ponca, and Blackwell are the leading melon-shipping points. Parties from the famous Rocky Ford district planted large tracts to cantaloupes in

LINCOLN COUNTY KAFFIR CORN.

KAY COUNTY WATERMELON FIELD.

Oklahoma County this year, and it is generally conceded that the Oklahoma product is as abundant and of as choice flavor as any melons from that district.

At Waterloo a cooperative colony will ship largely.

At Lawrie are loaded more watermelons than at any other station, and in season they lie thickly all over the great Cimarron bottom. On One Hundred and One ranch, near Bliss, in the Ponca Indian Reservation, is probably the largest melon patch on the continent—over 400 acres all in one field, and all in melons. At one corner of this field is a large sign reading: "$5 fine for any person who passes this way and fails to eat a melon."

Farmers who have engaged largely in melon raising report a net profit of from $10 to $15 per acre.

GRASS.

The native grasses of Oklahoma are one source of great wealth for the Territory. The wonderful Buffalo grass of the western part of the Territory, which cures on the stalk as well as the best of cut and stacked hay, pastures thousands upon thousands of head of cattle the year round, not only sustaining their growth but often bringing them into condition for market with no other feeding. Then there are the native blue stem, gama, and other grasses, which cover the rolling prairies, the hills and valleys, and the woodlands of Oklahoma with a carpet of rich green verdure.

No other portion of the country has better native pasture than does Oklahoma, and thousands upon thousands of tons of prairie hay are cured and marketed every year. In many places the native grass grows from 4 to 6 feet in height, and the western portion of the Territory—called by some the "short-grass country"—astonishes visitors with growths of this kind in the fertile bottoms, and waving oceans of grass of unusual length cover all the land.

Many varieties of cultivated grass have been tested and some proven quite successful. Of these alfalfa has produced the best results. It does well in the eastern half of the Territory, producing three cuttings of hay per season. The hay is so rich that animals require no grain to fatten, and as a pasture, particularly for hogs, it is unexcelled.

Some of the clovers do well, as does also timothy.

OATS.

Until within the past year or two but little attention was paid to oats, but the crops last year and this have been very large. The Territory seems well adapted to their production and the yield is prodigious, often running well up toward 100 bushels per acre, and 50 to 60 bushels is a common average.

FODDER CROPS IN OKLAHOMA.

The possibilities of this Territory as a feeding and breeding ground for the beef steer are unequaled. It would be hard to find a region where the variety and amount of forage crops that can be grown is greater than here, coupled with a climate that makes shelter of any sort a luxury. The corn and alfalfa of the central and eastern portion with the "short grass" (that grows very tall) and Kaffir and sorghums of the western portion furnish feed for live stock which exceeds in value any other single interest, not even excepting the wheat crop.

The experiment station at Stillwater is studying the feeding value of the new forage crops about which little is known, and is securing results of great interest and value.

MILLET.

Millet does well in the greater part of the Territory, and more of it is raised each year, especially in the sections where creameries and cheese factories have been established, and increasing numbers of milch cows are being fed by farmers.

W. N. Reed, near Hoyle, raised this year pearl millet with stalks 12 feet high and heads 6 inches long, which he estimates will produce 20 tons of fodder to the acre.

CASTOR BEANS.

An important side crop for many farmers of the Territory has been castor beans. They produce well in most any part of the Territory though raised most extensively in the central and eastern portions. They yield from 12 to 18 bushels per acre, are easily harvested, and bring on the market from 85 cents to $1 per bushel. The crop last year for the Territory was about 125,000 bushels and will be about the same this year.

PEANUTS.

Every year the people of Oklahoma learn by experimenting of some new crop adapted to the Territory, and it is this constantly increasing diversity of crops that makes the Territory so attractive to the people of other localities where but two or three crops can be successfully raised.

The farmer here is not compelled to run his chances on one single crop, but can insure at least moderate success in any year by adapting his crops for the year to the character of the season—wet or dry, hot or cold—he having choice of six or eight leading crops, any one of which is remunerative, and part of which can always be found especially adapted to the character of the season. For some years farmers here and there over the Territory have planted small patches of peanuts and found them to yield abundantly, but it was not until last year that any attempt was made to raise them on a commercial scale.

About 100 acres were planted by S. P. Atherton, J. W. Durst, and Jefferson Bowen, farmers near Wright, Lincoln County, and the success of the crop surprised everybody. The nuts produced were of good size, with firm meat, and yielded from 50 to 100 bushels per acre, the general average being in excess of 60 bushels. As the crop sells for 60 cents per bushel the return was found to be very desirable, and this year fully 1,000 acres of peanuts have been planted and Oklahoma will supply a large part of the peanut trade in the cities of the middle West.

The Oklahoma peanuts rate as well as those of Virginia or California and the growing of these nuts for market will be an important industry in Oklahoma.

The three men who grew the nuts so successfully last year purchased a peanut thrasher and kept it running all the fall on their own crops and those of their neighbors. This is the only thrasher of the kind at work anywhere between the Pacific Slope and the Alleghenies. A feature of the peanut crop that adds to its profit and success is

THRASHING OKLAHOMA PEANUTS.

LOGAN COUNTY APPLES—48 TO THE BUSHEL.

that hogs will fatten most readily on rejected nuts and will root out all that are left in the ground, while the thrashed vines make a hay very nutritious and highly relished by live stock.

VARIOUS OTHER PRODUCTS.

Broom corn has been profitably raised in all parts of the Territory, and where a man engages in it largely, erects proper drying sheds, and ships by the carload it can be made one of the most profitable crops of the section.

Tobacco can be grown with success in parts of the Territory.

Cowpeas, beets, rutabagas, turnips, and other similar products for cattle feed are readily grown everywhere in the Territory.

All kinds of garden vegetables do well. Tomatoes produce famously, radishes and beets grow to mammoth proportions, and peas, beans, lettuce, etc., are plentiful everywhere.

Sweet potatoes grow like weeds and produce enormously of the best quality. Irish potatoes do well in most sections, though the late potatoes do not keep well. Oklahoma raises the finest early potatoes in the West and they are shipped out by the carload in May and June.

GRAIN INSPECTION.

The last legislature passed an act creating the office of Territorial grain inspector and providing for the inspection and grading of wheat at all elevators and shipping points, which will give Oklahoma wheat a better standing on the markets of the world and be of benefit alike to grain buyers and wheat raisers.

Grain elevators in the Territory.

Town.	Number of elevators.	Aggregate capacity.	Town.	Number of elevators.	Aggregate capacity.
		Bushels.			*Bushels.*
Newkirk	4	72,000	North Enid	2	30,000
Ponca City	4	110,000	Kremlin	1	15,000
Perry	4	125,000	Pondcreek	1	20,000
Mulhall	1	18,000	Jefferson	1	20,000
Orlando	1	9,000	Medford	2	35,000
Bliss	1	8,000	Nardin	1	15,000
Redrock	1	12,000	Blackwell	2	35,000
Guthrie	3	33,000	Weatherford	2	30,000
El Reno	4	130,000	Geary	2	20,000
Okarche	4	56,000	Yukon	3	55,000
Kingfisher	9	138,000	Oklahoma	6	142,000
Dover	1	8,000	Norman	3	55,000
Hennessey	7	75,000	Moore	1	8,000
Waukomis	4	60,000			
Enid	4	80,000	Total	79	1,341,000

HORTICULTURE.

No other section of the United States can successfully raise as many kinds and varieties of fruit as Oklahoma, and the day is not far distant when Oklahoma fruit will be as well and favorably known in the markets of the world as those of California, Florida, or any other fruit-growing section. Something over 20,000,000 fruit trees have been planted by the farmers and orchardists of the Territory and when these all come into bearing Oklahoma fruit will be shipped to every market. The people of the Territory do not themselves

realize how great the number of fruit trees they have planted. As comparatively few of the trees bore until the last year or two every man kept on planting, and as the few trees that bear are young and produce the minimum amount of fruit the planting is still kept up. When these trees, in a few years, come into full bearing the fruit crop of the Territory will be something enormous. In the towns every residence lot has from 6 to 2 dozen fruit trees upon it, some of the towns being veritable orchards. So far the fruit crop has found a ready home market but in a few years the shipment will be large and canning, preserving, and pickling establishments will be necessary to care for the crop. The sale of fruit jars for the canning and preserving of fruits for domestic use has reached over 12,000,000 the past two years.

The saving at home of the large amount of money which would otherwise have gone out of the Territory for canned fruit represents no inconsiderable item in the present great prosperity of the Territory.

Contrary to the general expectation, at first, apples are doing well in all parts of the Territory. Peaches, plums, pears, apricots, cherries, grapes, strawberries, raspberries, blackberries, and various other kinds of fruit do well. Thousands of gallons of the finest wines are produced every year.

Every farm has a fine growing orchard and many farmers have put 40, 50, and even 60 acres out to fruit. The size of Oklahoma fruit is always above the average, the flavor the best, and the grower does not have so great a number of insect pests to fight as have the majority of localities.

PEACHES.

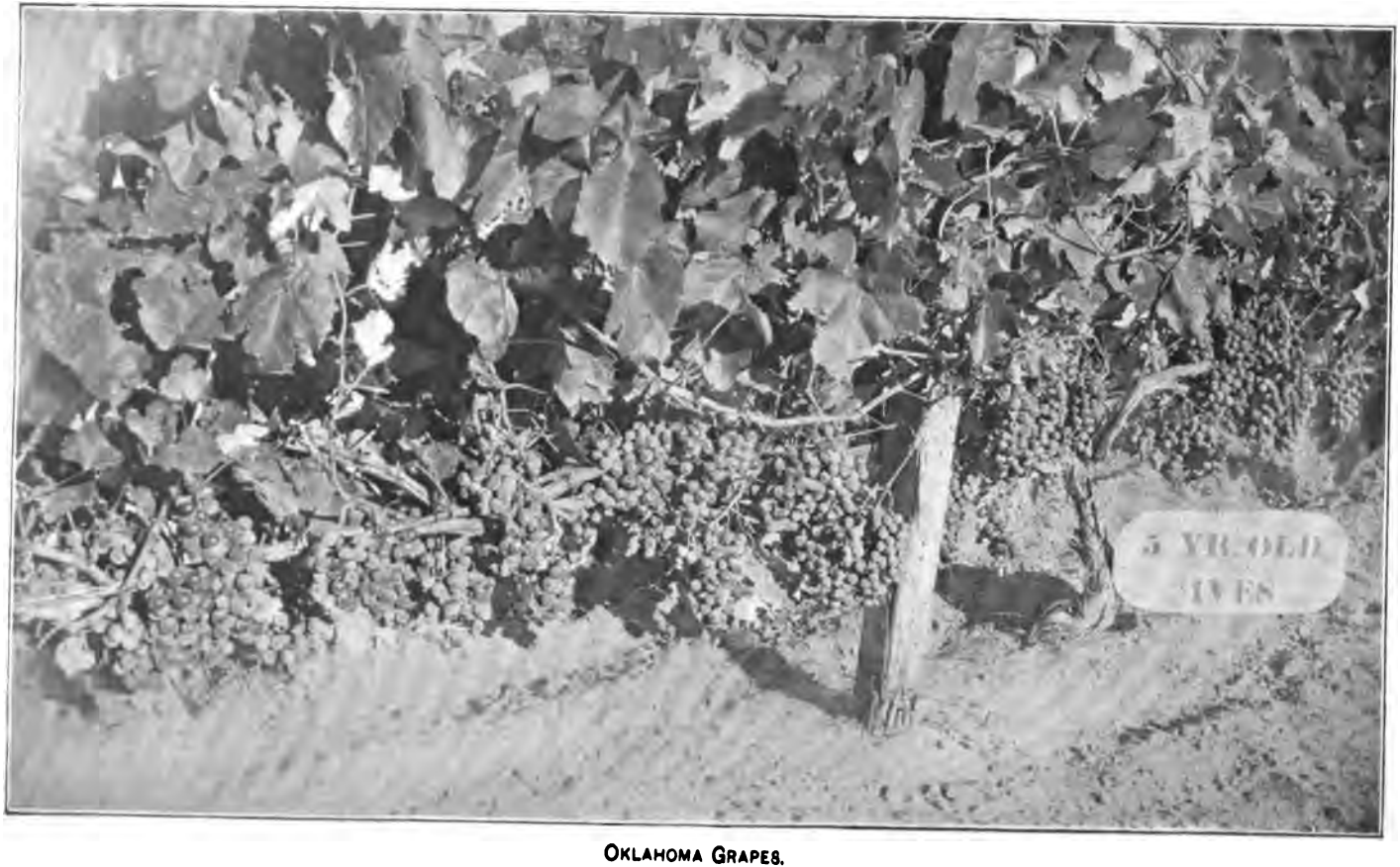
All varieties of peaches do well in Oklahoma. Owing to the unprecedented cold weather of last winter the crop this year was not large, but most localities have sufficient to supply the local demand, which insures a good fair price to the grower. Many Alberta peaches are shown weighing from 9 to 12 ounces, and measuring 10 and 11 inches in circumference. Many peach trees bear when but 2 years old, and at 3 years from the seed it is not uncommon for a tree to produce as much as a half bushel of peaches. The growth of the trees is remarkable in all parts of the Territory. The peaches of Oklahoma ripen from late June until November, and Oklahoma will in a few years be one of the important sources of the nation's supply of peaches.

OKLAHOMA APPLES.

When this country was thrown open to settlement not more than one in twenty believed apples could be grown here. A number planted trees—some of them with little faith—and when it was seen the trees were growing the skeptics would shake their heads and say, "They will never bear fruit." Four years ago, to the surprise of the doubting ones, a few of the trees began to bear fruit, and the last two years convinced every observant person that apples could be grown of the finest grade, and this year makes it clear to the orchardist that Oklahoma is soon to be a great apple-producing State.

Of course many of the Northern varieties of apples do not do well in this Southern country, but experience has already developed that many varieties seem particularly adapted to the climate and soil of Oklahoma, and apples are shown here the equal of any grown in the famous apple orchards of the world.

HOW THE OKLAHOMA FRUIT GROWER IS REWARDED.



OKLAHOMA GRAPES.

Hundreds of Oklahoma farmers will this year have 100 or 200 bushels of apples, many have up to 500, some as high as 1,000, and several orchards in the Territory will yield from 2,000 to 3,000 bushels of this luscious fruit.

At the Territorial Experiment Station farm at Stillwater the following varieties of apples fruited in 1898: Broadwell, Cannon Pearmain, Cole's Quince, Crawford, Hockett's Sweet, Keswick Codlin, Lowell, Late Strawberry, Maiden's Blush, Moon, Mammoth Black Twig, Nansemond Beauty, Pomeroy, Talman's Sweet, Wagener, Water, Yopp's Favorite.

The following varieties of apples set fruit in 1899: American Summer Pearmain, Alexander, Arkansas Beauty, Arkansas Black, Bledsoe, Black Annette, Carolina Watson, Cullen's Keeper, Crawford, Cole's Quince, Domine Dickinson, Early Ripe, Fenley, Fallawater, Gano, Hightop Sweet, Ingram, Indian, Jones's Seedling, Kittageskee, King, Kansas Queen, Lowell, Limber Twig, Maiden's Blush, Missouri Pippin, Moon, Nantahalee, Nero, Pyle's Red Winter, Porter, Rambo, Rhode's Orange, Stewart's Golden, St. Lawrence, Twenty Ounce, Talman's Sweet, Wagener, Water, Willow Twigg, Yopp's Favorite.

Oklahoma exhibited apples at the Omaha exposition equal to any shown. In ten or a dozen years Oklahoma will be counted a great apple country.

GRAPES.

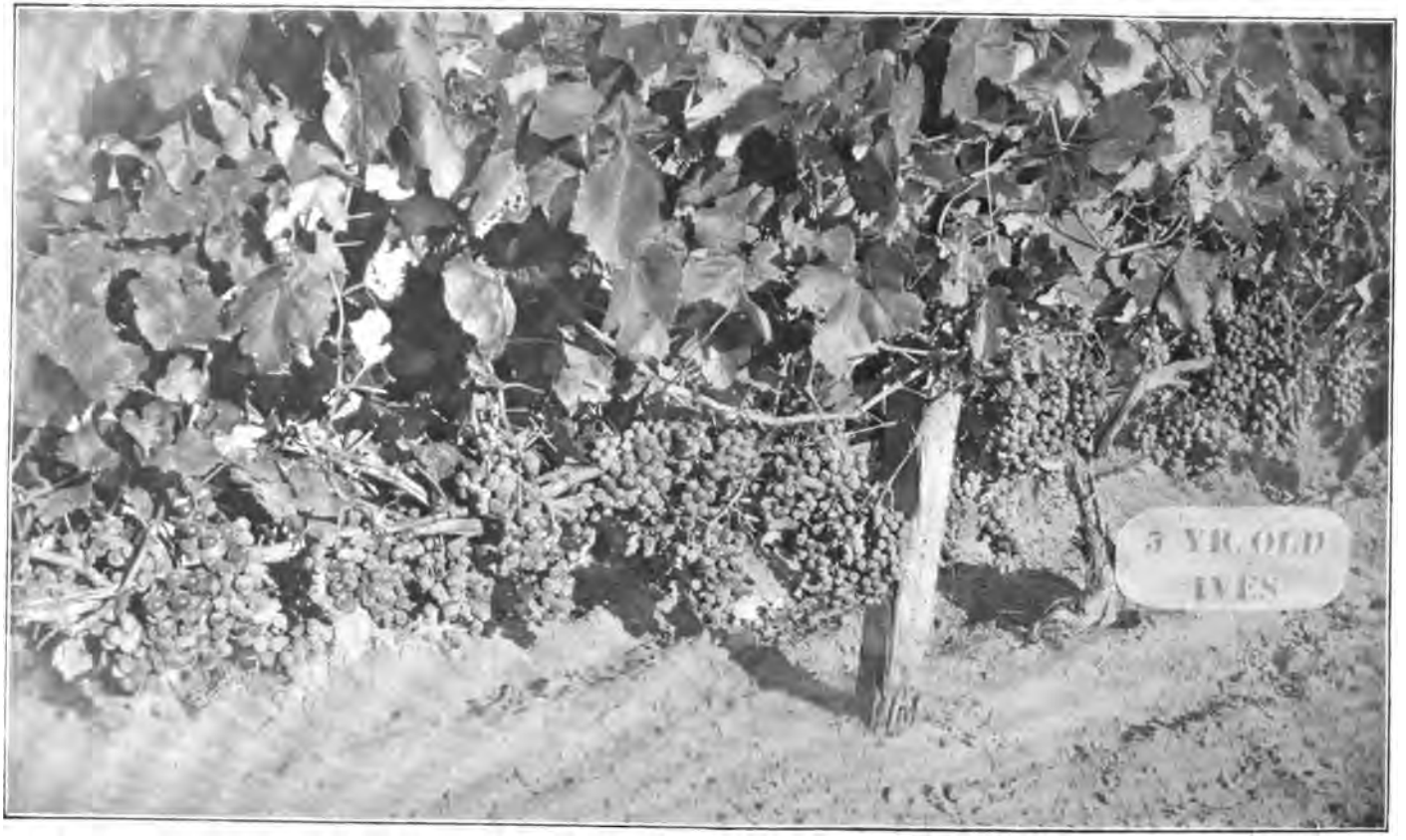
The fruit of the vine is indigenous to Oklahoma. Every variety of grape known from Maine to California, from Florida to Oregon, cae be grown in Oklahoma. So great is the production of grapes in the Territory that the home market is already overstocked, and the largn grower must either be prepared to ship in quantities or turn his surplus product into wine. Oklahoma has the ideal climate, combined with the best soil, for the most successful growing for either table use or wine of a greater variety of grapes than any other section of the United States.

The fruit grows in immense bunches, which ripen evenly, with no stung grapes or mildew, and, coming into maturity from July 15 to September 15, reach the markets ahead of the Northern grape and just after the Southern. Wine can be made without sugar from Oklahoma grapes and be almost as sweet as Northern wines made with sugar, and the wine made in Oklahoma matures a year earlier than that of the North. Already Oklahoma wines are favorably known on the markets. The rapid growth of the vines in Oklahoma are phenomenal. Many vines bear the second year from the cutting and a good crop is realized the third year, the yield continuing to increase steadily for almost a generation. Thousands of acres are in vineyards in Oklahoma and their area is being increased greatly each year. The manufacture of wine has already become an important industry of the Territory.

OTHER FRUITS.

Every variety of pitted fruit does well in Oklahoma. All of the native varieties of plums thrive and produce abundantly, and the results from the Japan varieties would seem all that could be asked, the trees bearing such loads as to weigh the limbs to the ground. Damsons, Green Gage, Chickasaw, Wild Goose, and others always do well, and a wild plum is found which is palatable, productive, and hardy, and capable of great improvement under cultivation.

UNIV. OF N.H.



OKLAHOMA GRAPES.

SEVEN YEARS' GROWTH SHADE TREES, WITHOUT IRRIGATION, KINGFISHER.

As fine apricots are raised as ever came from California; nectarines and German prunes, quinces, and crab apples all do well, and almond and fig trees have been grown to maturity and bearing.

But little attention was paid to pears the first few years and almost none planted. Some of the later planting are coming into bearing now and the yield is everywhere phenomenal. The dwarf varieties are best, and very fine specimens weighing from a half to three-fourths of a pound are shown.

Cherries of all varieties do well. The trees are of somewhat slow growth, but bear early and abundantly and handsome profits are realized from the crop.

BERRIES.

The home market for berries of all kinds has never yet been fully supplied, and there is money in berry growing in Oklahoma and will be for many years. The strawberry is nowhere grown to greater perfection than in Oklahoma. Of large size, delicious flavor, and abundant yield, nothing more could be wanted. The grower finds a home market at a good price for all he can produce. Oklahoma is the home of the blackberry and the dewberry, and they grow rapidly, are prolific in bearing, and a sure crop every year.

Near Dale, Mr. Taylor gathered from 1,700 Early Harvest blackberry plants 1,100 gallons of berries, and disposed of them at 25 cents per gallon. He derived $275 for them, and the plants had been set out but eighteen months. A farmer living about 5 miles east of Shawnee had less than a quarter of an acre of the Early Harvest blackberries, and this season's crop cleared him $100 after having hired the berries picked. Another farmer living a few miles northeast of Tecumseh had 3 acres of two-year-old Early Harvest blackberries this season and the receipts enabled him to deposit $800 in the bank.

Gooseberries can be grown with success, and raspberries do moderately well in many localities.

IRRIGATION.

Oklahoma has a complete irrigation law, defining and providing for water rights in every detail, but the rainfall is so abundant and ordinarily so well distributed throughout the year in almost all of the Territory that but little has been done in the way of irrigation.

In Beaver County a considerable system of ditches has been maintained along the Cimarron Valley with success and profit, and many private plants for pumping from rivers by steam or gas engines and from wells by windmills are located in various parts of the Territory, though mostly on a small scale.

The grower of vegetables, fruits, and berries has come to learn, however, that no matter how abundant the rain the possession of a supply of water to turn upon the garden, field, or orchard at just the right time pays a big profit on its cost, and irrigation is destined to receive more attention in the Territory, as well as everywhere in the West, in the future.

The Commissioner of the General Land Office has granted right of way for canals and reservoirs on public lands in Oklahoma to the Claremont Land and Irrigation Company and the Settlers' Milling, Canal and Reservoir Company.

SEVEN YEARS' GROWTH SHADE TREES, WITHOUT IRRIGATION, KINGFISHER.

BUNCH OF 1,300 HEAD OF CATTLE, ROGER MILLS COUNTY.

LIVE-STOCK INTERESTS.

While all branches of agriculture are conducted, perhaps, as successfully and as profitably in Oklahoma as elsewhere, the handling of live stock offers special inducements, and by reason of favorable conditions existing here should prove remunerative even when unprofitable in other localities. The short winters, the luxuriant growth of grasses, pasturage upon which stock may be grazed almost the entire year, and abundance of water and a supply of all the grains grown in the temperate region are ideal conditions for the growth and development, at minimum cost, of live stock of superior quality.

The live-stock interests of Oklahoma are very large and the amount of money invested therein increases every year.

By enactment of the legislative assembly in 1895 the board of regents of the Agricultural and Mechanical College were constituted ex officio a Territorial live-stock sanitary board charged with the execution of a law enacted for the encouragement and protection of the live-stock industry. The board has held many meetings and done much along this line, and I believe its work has been beneficial to the Territory, the farmer, and the stock raiser.

Very little disease has appeared among the live stock of the Territory during the past year, and prompt action by the live-stock commission or its agents has stamped out and prevented any general contagion from the cases that did appear.

The assessors' returns for 1899 show the following number of head of live stock returned for taxation in every county in the Territory:

Head of live stock assessed in 1899.

County.	Horses.	Mules and asses.	Cattle.	Sheep.	Swine.
Beaver	6,192	371	75,171	11,005	411
Blaine	5,032	764	8,112	1,081	2,677
Canadian	11,397	1,910	143,583	1,117	5,194
Cleveland	6,645	2,741	9,008	390	11,227
Custer	6,759	1,473	39,662	198	6,136
Dewey	4,677	1,022	21,175	154	8,454
Day	1,905	244	23,098	16	558
Garfield	13,174	2,741	20,362	200	15,508
Grant	10,971	1,782	23,685	76	15,217
Greer	16,088	2,338	58,649	12,759	4,769
Kay	11,891	1,891	17,590	152	14,605
Kingfisher	9,695	1,334	16,451	222	5,614
Lincoln	11,906	3,596	16,342	839	18,142
Logan	9,241	2,533	14,372	162	11,452
Noble	6,706	1,364	39,096	70	10,203
Oklahoma	8,001	2,446	13,196	208	11,549
Pawnee	10,974	2,045	59,434	1,473	26,432
Payne	10,696	2,677	17,865	370	22,586
Pottawatomie	10,290	3,993	18,865	187	10,679
Roger Mills	5,575	851	32,986	2,118	996
Washita	8,950	2,223	32,867	113	5,892
Woods	22,989	2,659	62,912	2,302	23,797
Woodward	7,317	693	85,286	1,446	1,390
Total	216,971	44,191	849,767	36,652	228,498

CATTLE.

The most important branch of the live-stock industry of the Territory is that of cattle raising and it is largely to the protection of the cattle of the Territory that the live-stock commission have directed their work.

A decided effort has been made the past year to stamp out the Texas fever from among our cattle, and though we have not been as successful as is desirable still the amount of splenetic fever has been less than in former years. Experience has convinced every member of the board that in order to fully protect and guard the best interests of the Territory in this regard the most rigid quarantine must be maintained against the admission of Southern cattle, and the present year the southern line of the Territory will be rigidly guarded and no open season allowed in which cattle are moved indiscriminately. As a result the Federal authorities have conditionally moved their quarantine line one tier of counties farther south and east, and we hope within a very few years to have all Oklahoma above the Federal line, having stamped out all infection of Southern or splenetic fever from the herds of the Territory.

Oklahoma cattle are already recognized as of a high grade and the cattle growers everywhere are grading up their herds. In western Oklahoma the Texas Longhorn no longer predominates as all the herds show evidences of grading, and in Woodward, Beaver, and other western counties are many valuable herds of thoroughbreds or high-grade cattle, while on the farms of the more thickly settled sections are everywhere seen high-grade dairy and stock cattle.

The leading cattle raisers of the Territory have been for some years organized as the Oklahoma Live Stock Association. This association continues to make a steady growth. It now has membership in Kansas and Texas as well as Oklahoma and maintains careful brand inspection at all the markets. It has a membership valuation at the present time of over $6,000,000. Live-stock conditions are prosperous and the outlook for the future is indeed encouraging.

W. E. Bolton, secretary of the Live Stock Association, and editor of the Live Stock Inspector, published at Woodward, in a recent communication speaks as follows on

THE LIVE-STOCK INTERESTS OF WESTERN OKLAHOMA.

Some sections of the country were settled when the people got off on the wrong foot. Western Oklahoma is more fortunate. The people have made no mistakes. It was created for a cow country, and the cattle interests have flourished from long prior to the opening of the strip for settlers.

In some sections here the homesteaders, for a season, tried to raise cotton and succeeded, but when they compared it with the profits from grazing and feeding cattle, they promptly abandoned the cotton, and now there is no difference of opinion. This is the most favored spot in all the broad West for grazing cattle intended for feeders. The plentiful water, the rich grassy prairies, interspersed with broad alluvial, subirrigated creek and river bottoms, make a perfect ranch country for the growth of prime steers for the feed lots of eastern Oklahoma.

The rich bottom lands will raise an abundance of feed to keep the yearlings growing from the time they are calves to the time they are ready to be finished by ninety to one hundred days full feed on corn or cotton-seed meal.

The complaint has gone up from some of the Western ranges that the range has been overstocked and that the grass is gone.

The Agricultural Department is asked to devise some means of restoring the growth of grass. Western Oklahoma pastures are perfect. Never was there a better growth of grass than we have this year. The cattle were a little late in getting full flesh, but to-day they are going to market in prime condition.

We are very fortunately situated, just between the great corn belt and the great breeding grounds of Texas. We realize that the calf crop is not as good on our range any year as it is in Texas, southwest of us.

The demand and prices for feeders this year are very satisfactory. The owners of herds are getting well paid for their investment and trouble, and are in good condition to fill their pastures and feed lots for the coming year. Feed is plenty and of the best quality. Corn is good this year, but can not be depended upon.

Kaffir corn has made a perfect crop, and the cane fields could not be better. Everybody learned a lesson from the scarcity of feed last year, and all have prepared to feed liberally this winter. The day has passed when many men will go into the winter with a string of 900-pound steers and come out with 700-pound steers.

It is now a universally accepted fact that it is far more profitable to at least keep all the weight you have, and gain some if possible, between Christmas and April. It is a grand sight now to ride over the luxuriant pastures filled with fat cattle and look off into the valleys covered with stacks or ricks of cane hay, or prairie hay. The hay crop is immense, and every man is doing his best to provide an abundance for the winter's consumption. The outlook for the cattle industry never was brighter. The clouds of last winter have all vanished. The solvency, stability, and business energy of the cow men is clearly exemplified in the very small number of failures from the severe losses of last winter.

Never again will the capitalist be afraid to invest in cattle paper. While there has been considerable dissatisfaction with the imperfect inspection of cattle by the sanitary board, we have escaped infection to a remarkable degree. The ranges were never freer from infectious disease. If from now on the board will give us at least one good, energetic inspector to cooperate with the United States inspectors and the Kansas inspectors, by another year all Oklahoma above the quarantine line will be absolutely free, and the line can be moved south, adding millions in value to Oklahoma cattle.

The great need of western Oklahoma is a cattle exchange at which the feeders can be sold direct to the Kansas and Missouri and the eastern Oklahoma purchasers and feeders without paying so much tribute to the railroads and live-stock markets. If we had, at some central point on the range, a properly organized exchange, the expense of marketing would be decreased one-half. Why should a herd of cattle be shipped to the great markets and then back to central Kansas to be fed? Why not ship direct from the range to the feed lot by the shortest railroad route? The shrinkage in the cattle and the railroad haul would be a handsome little profit to the range men and feeders.

The cattlemen need better organization. It would advance both their interests and the interests of the consumers. The corn raisers of Missouri, Arkansas, and Mississippi should cooperate with the Western cattle raisers to further their mutual interests. Oklahoma cattle always top the markets.

HOGS.

During the year just closed over 2,500 carloads of hogs were shipped from Oklahoma to market, and each year the farmers of Oklahoma are turning their attention more to hog raising as a most profitable adjunct to general farming, while the number of large exclusive hog raisers is also increasing.

In many localities well adapted to hog raising little attention was paid to this industry because of the long distance to railways, but the building of many new lines of railway in the Territory has greatly stimulated the industry. In no section of the United States can better pork be produced with the minimum of cost and labor.

In the wooded sections hogs feed on nuts and mast and need very little grain, and many farmers are marketing the finest hogs fattened entirely on alfalfa pasture.

OTHER LIVE STOCK.

Oklahoma has produced a number of horses with enviable track records, and several large horse farms have recently been established in the Territory, but the supply of horses has been but little beyond the local demand. With a climate in which horses can run at large almost every day in the year, with its magnificent areas of grass, and its abundant crops of hay and grain, Oklahoma is destined to become known as an important horse-producing section. Several years ago sheep were to be found in but two or three counties of the Territory, and now there are some in every county, with very large herds in Beaver and Greer counties. Oklahoma farmers are learning that

sheep are very profitable in this country, every part of which seems admirably adapted to sheep raising. After making a recent trip through Beaver County, an inspector of the Territorial school land department in an interview spoke of the profits of sheep and other live-stock raising as follows:

The big ranchmen out there live the serene and happy life. Their homes are as comfortably furnished as those of wealthy men in cities. I was especially struck with the ranch of Robert Dean, United States commissioner, who lives 4 miles from Garrett. By means of irrigation his yard was a veritable rose garden. He owns 5,000 sheep, from which he sells lambs and wool. He told me enough to show that his was a prosperous business. For the last five years the cost of maintaining each sheep a year did not exceed 38 cents. His wool crop this year averaged 8 pounds to the sheep, for which he got 15 cents per pound. He got $1.50 each for his lambs. Assuming that he got 1,500 lambs, his income from this source was $2,250; his wool amounted to $6,000, making a total of $8,250. From this deduct the cost of 38 cents for each sheep, $1,900, and you have $6,350 left. It is safe to say that his net profits were easily $5,000. He told me that he never fed his sheep a mouthful of grain or forage, which means that Mr. Dean sits contentedly at home growing rich with little exertion. Cattle raising is just as remunerative. When a young man gets married in that country he locates in some valley where grazing is good and builds him a "dobe home;" then he digs a big pond and buys a windmill. His next work is to turn loose fifty or sixty cows and his start in life is made. All he has to do is to watch his cattle, keep his pond full of water, and raise a little forage for emergencies. I know of many young men living just that way and doing well.

The poultry industry is no small item in the prosperity of Oklahoma. Ideal conditions for the successful raising of poultry prevail in Oklahoma, and the Territory is now making large daily shipments of poultry and eggs. On one occasion during the past year when the cold weather produced an egg famine in the North, Oklahoma rushed eggs to market by the carload, over 1,500 dozen being marketed by farmers in the city of Perry alone in a single day.

MINES AND MINERALS.

But comparatively little mining has been done in Oklahoma, unless the quarrying of large quantities of building and paving stone be classed as mining.

Coal is mined to a limited extent in Pawnee County and in the Osage Reservation, but veins of varying thickness and quality have been discovered also in Payne, Lincoln, Logan, and Pottawatomie counties and in the Kiowa and Comanche Reservation.

In the mountainous country in the extreme western end of Beaver County are many indications of mineral deposits, and on Carisco Creek, near Kenton, several rich deposits of copper have been located. Independence tunnel in North Cairo camp near there is over 200 feet into the sandstone mountain or butte, and 200 to 500 pounds of copper ore are being taken out per day. This ore assays from $75 to $250 per ton, and though it is necessary to freight it by wagon 90 miles to Lamar, Colo., and thence by rail to Pueblo for smelting, the mine is paying a handsome profit over and above all expenses.

There are other deposits equally as rich in this section.

There are indications of zinc and lead at several points in eastern Oklahoma and in the Kiowa and Comanche Reservation.

The Wichita Mountains, located in this Indian reservation in the southwestern part of the Territory, have long been the Mecca of numerous old miners, prospectors, and boomers, who have believed that in the deep canyons and rocky recesses of these mountains were locked great treasures of gold, silver, and other precious metals. The

NATURAL TUNNEL, 400 FEET LONG, BLAINE COUNTY.

PRIMITIVE SALT WORKS ON SALT CREEK, BLAINE COUNTY.

fact that the mountains were on the forbidden ground of an Indian reservation and prospectors caught there were summarily ejected has seeemed to convince all of them that some great hidden treasure was being guarded by the Indians and the Government.

Periodical stories of old Spanish mines, ruins of smelters, buried treasure, caves lined with purest ore, canyons where gold nuggets lay thick as pebbles, all guarded by Indian braves whose vigilance never relaxed, have appeared from time to time to excite the credulous, but have always been lacking the essential element of tangible proof of any sort. Lewis and Clarke, in the report of their explorations in the Southwest, tell of indications of cobalt, asphalt, zinc, iron, and copper in these mountains, and there is no doubt of the existence of these and other mineral deposits, but the stories of abandoned Spanish gold mines or of the existence of gold or silver in any appreciable quantity wholly lacks confirmation.

Whether the deposits of the baser metals above mentioned are extensive enough to be of any great value or to make a prosperous mining region of the reservation at some future date, it is impossible at this time to say. Experts, however, agree that the indications of asphalt and oil are such, however, as to indicate a field rich in these products.

In Blaine County are inexhaustible deposits of rock salt, and the cement and gypsum deposits of the Territory are numerous and great in extent.

In the Glass Mountains and in the Osage Reservation are indications of several minerals which time and development will reveal to be great or small.

While it will be seen there are indications of minerals in various parts of the Territory and some real development, it is certain that the greatest mineral wealth of the future State of Oklahoma lies in the coal beds, asphalt, zinc, lead, and oil deposits of what is now the Indian Territory.

UNDEVELOPED RESOURCES.

A careful consideration of the sections of this report devoted to agriculture and horticulture, mines and minerals, and manufacturing will show many undeveloped resources of the Territory, offering opportunities for the investment of capital and labor. The great stone, cement, and salt deposits offer special inducements for development.

Of these probably the most extensive in the West are found in northern Blaine County. Here is a great natural park, with rocky bluffs of pure gypsum penetrated by natural tunnels hundreds of feet long and canyons bridged by natural bridges of great beauty. In one of these canyons rises Salt Creek, one of the most wonderful streams on the continent. Having its source in one of the canyons of the park, this stream flows out from the hills across the prairie to the Cimarron River, whose waters are made as bitter as the ocean by its influx. The source of Salt Creek is brine oozing up from great beds of rock salt at a depth of not over 150 feet, and the water of the stream is so strongly impregnated with salt that when evaporated it yields half its weight in salt pronounced 99½ per cent pure by chemists. For over 4 miles from its source no fresh water enters the creek, and it is estimated that the regular flow of water if all evaporated would yield from 40 to 50 carloads of salt per day. This from the ordinary flow of the stream, and the amount could be greatly increased

by shallow wells, while the deposit of rock salt must be almost inexhaustible.

Salt is manufactured there now in half a dozen primitive plants, but the region offers great inducements for the investment of capital.

OIL AND GAS.

There are unmistakable evidences of oil and gas at many points in the Territory. In Payne and Pawnee counties are several springs where the water is polluted with oil, and in the Chickasaw Nation and the Kiowa and Comanche reservations are oil springs and large deposits of asphaltum, which are but the residue of great fields of oil.

The well put down to a depth of 1,100 feet in the Osage Reservation, near Pawhuska, two years ago was recently opened and made a run of 300 barrels. Paying wells are being put down in all parts of the Creek country just east of Oklahoma. A local company is putting down a well at Guthrie.

These known deposits of oil, together with the fact that part of Oklahoma lies in a direct line from the oil fields of Kansas to those of Texas, all indicate that at some place in the Territory gas and oil will be found in paying quantities.

MANUFACTURING.

While the manufacturing interests of Oklahoma already are considerable in extent and embrace many branches, they are really but a mere indication of the industrial development that is to come within the next few years. The development of manufacturing industries the past year has been almost tenfold that of any previous year of the Territory's history, and everything points to a still greater expansion the coming year.

Among the largest manufacturing institutions of the Territory are the cotton-seed oil mills at Guthrie, Oklahoma City, Purcell, Shawnee, Chandler, and Stroud. There are also cotton compresses at El Reno, Oklahoma City, and Shawnee and round bale gins and compresses combined at Guthrie, Chandler, Wellston, Tecumseh, and several other points, with fully 200 cotton gins scattered over the Territory, the larger towns in the cotton district having from two to six each. These are the industries dependent upon the cotton crop of the Territory, and cotton spinning and weaving mills must follow in the near future. Oklahoma City, El Reno, Shawnee, and Guthrie have foundries and planing mills. Oklahoma City has a large sash, door, and blind factory, a mattress factory, and a shirt and overall factory. Guthrie and Oklahoma City have harness manufactories, and every town of any size in the Territory has brick-manufacturing plants.

There are creameries at Oklahoma City, El Reno, Hennessey, Guthrie, Manchester, and Stillwater, and canning factories at Oklahoma City, Chandler, and Guthrie.

The Choctaw machine shops employ a large number of hands at Shawnee. Brooms are manufactured in many towns; there are a dozen or more cigar factories in the Territory; and the manufacture of wine from the abundant grape crop of the Territory gives employment to many people. Cheese factories at Perkins and Orlando do a large business, and there are large ice and cold-storage plants in operation at Perry, Ponca, Blackwell, Guthrie, Oklahoma City, Shawnee, Chandler, El Reno, Kingfisher, and Enid. Oklahoma City and Guth-

rie have carriage and wagon factories. The flouring mills also form a large industry, which is spoken of in detail elsewhere under the head of "Milling interests."

A large cement works near Okarche is running day and night, employing a large force of hands and shipping its products to all parts of the continent. Other cement works are located at Newkirk, and still others projected at Stroud, and in Greer and Blaine counties.

The stone quarries and kindred industries employ hundreds of hands, the leading ones being at Ponca City and Newkirk. These are but a small portion of the industries of this character, the tabulated statement given under the head of "Industrial development of cities" showing an aggregate of 138 manufacturing establishments, employing a total of about 2,000 hands—and these in fact not representing much over half of those in the Territory. There are many opportunities and openings for small manufacturing industries in every portion of the Territory. The ready market for all products, the saving in transportation, the cheap fuel, and the great variety of products of the soil of Oklahoma, together with the great development in every line and rapid growth in population, makes Oklahoma a very desirable location for innumerable manufacturing industries.

MILLING INTERESTS.

Oklahoma is well supplied with flouring mills, and more are being erected as the different localities develope.

There are in operation in the Territory at present 35 flouring mills, with an aggregate daily capacity of 5,100 barrels of flour, as follows:

Flouring mills of Oklahoma.

Name of operator.	Location.	Capacity per day.
		Barrels.
Perry Mill Co	Perry	250
Newkirk Milling Co	Newkirk	200
B. Walkentine	Blackwell	300
Mulhall Roller Mills	Mulhall	80
Capital Roller Mills	Guthrie	125
Model Roller Mills	do	75
Snyder Roller Mills	Edmond	100
Eagle Mills	do	70
Acme Milling Co	Oklahoma City	500
Plansifter Milling Co	do	150
Norman Mill and Elevator Co	Norman	150
Wingate Milling Co	do	75
Crescent Milling Co	Crescent City	40
Betner & Allis	Cushing	40
A. Brett	Yukon	50
El Reno Mill and Elevator Co	El Reno	400
Canadian County Mill and Elevator Co	do	400
Alva Milling Co	Alva	50
Oklahoma Milling Co	Kingfisher	300
Kingfisher Milling Co	do	50
Farmers' Mill and Elevator Co	Enid	80
Enid Mill and Elevator Co	do	300
Garfield Milling Co	do	100
Pond Creek Mill and Elevator Co	Pond Creek	125
Medford Mill and Elevator Co	Medford	150
Geary Mill and Elevator Co	Geary	150
Weatherford Mill Co	Weatherford	150
Stillwater Mill Co	Stillwater	50
Lincoln Mill Co	Chandler	50
Shawnee Mill and Grain Co	Shawnee	100
R. H. Grimes	Hennessey	100
Cross Bros	Lamont	50
Lexington Mill Co	Lexington	40
W. S. Mathers & Co	Pawhuska	100
Ponca Mill and Elevator Co	Ponca City	200
Total aggregate capacity		5,100

Several other large mills will be erected in the Territory this season.

Oklahoma flour is favorably known in the markets of the world, large shipments having been made the past year to Liverpool, Havana, Mexico, South America, and Japan. Oklahoma flour took first premium at the World's Fair at Chicago, and was awarded three gold and five silver medals at the Trans-Mississippi and International Exposition at Omaha.

FUEL AND LUMBER.

As in most other things, Oklahoma is well situated for fuel and lumber, and has a liberal supply of both at reasonable prices. While the lumber and coal interests of the Territory are not so extensive as those of many States, the proximity of the great coal fields of the Indian Territory and Arkansas and the great pine and cypress forests of Arkansas and Louisiana and Texas insures cheap fuel and lumber to the Territory for generations to come.

Our native timber includes oak, elm, walnut, pecan, hickory, black gum, cottonwood, ash, hackberry, cedar, etc., in abundance, and much lumber is cut from them, especially in the eastern tier of counties, which are most thickly timbered.

Coal ranges in price from $2 to $8 per ton, according to locality and quality, and good oak wood averages about $2.50 per cord, with elm and cottonwood at $2.

LABOR SUPPLY.

The demand for labor in Oklahoma has always been well up to and often in excess of the supply. Farm laborers are always in demand in the agricultural sections, and during the wheat harvest and cotton picking there is always a shortage of help. The supply of capable domestics is never equal to the demand, and good wages are paid.

The manufacturing industries of the cities are each year offering employment to increasing numbers; and the large amount of building and railway construction the present year has created a demand that could not be supplied except by the bringing in of hundreds of laborers.

No person willing to work need ever be idle for any length of time in any part of Oklahoma.

PUBLIC HEALTH.

Perhaps in no part of the United States are there so many influences at work that contribute to a healthy body and a long life as are to be found in Oklahoma. Every condition that leads to the destruction of germ life and germ-destroying diseases, a large percentage of days of sunshine, a mild, salubrious climate, a porous soil, balmy breezes, a low point of humidity, and hours that entice and keep the health-seeker out of doors—we may truly say all night as well as all day, for most of our people sleep with doors and windows open a large number of the months in the year—are found on every hand in this land.

The very diseases that go to make up the high death rate in north ern and more humid climates are the very ones that are reduced to a minimum with us—consumption, diphtheria, and kindred diseases are rarely developed.

TERRITORIAL BOARD OF HEALTH.

No State has a more efficient board of health than has Oklahoma. Although during the past biennial period smallpox of a virulent type

was introduced into the Territory and obtained a foothold, nevertheless it has been speedily stamped out by the prompt and energetic action of our Territorial board.

The general sanitary conditions, water supply, sewerage, etc., are carefully looked after. Our schoolhouses and other public buildings are kept in excellent condition, as the percentage of sickness gives evidence.

BULLETIN OF PUBLIC HEALTH.

In keeping with advanced methods of other State sanitary boards, the Territorial board of health has issued from time to time a bulletin of public health, which has contained matter of sanitary interest to our people, public health notes, and valuable suggestions for the preservation of health. This work has been highly appreciated by the medical profession and the people as well.

PUBLIC INSTITUTIONS.

The health among the students of our three Territorial institutions of learning has been excellent. The youths who attend these schools we can not but believe are superior physically to those of many other sections. Little is seen in Oklahoma of the pale, puny, sickly girls who so often attract our attention in higher institutions of learning; but in their place we find finely developed, rosy cheeked lasses, and young men that are no less well physically developed.

The asylum for insane at Norman is a well-kept institution; very little sickness has existed in the same the past year.

MINERAL SPRINGS.

Although these have not been developed as they will be in years to come, nevertheless we have the authority of our Territorial superintendent of health (Dr. Buxton) that some of the most valuable sulphur springs in the world are to be found in this Territory. In fact the doctor is confident that these springs far exceed; in their curative properties, owing to their valuable chemical compositions, many of the noted sulphur springs in other parts of the world. One of these most valuable springs of this class constantly sends forth a stream that fills a 4-inch pipe, coming to the surface out of the rock as clear and sparkling as the finest spring water. Many other springs having valuable medicinal qualities abound.

MEDICAL PRACTICE.

The medical law of Oklahoma, which has been thoroughly enforced by our superintendent of public health, has given to us an enviable selection of physicians, as learned and as bright a class of men as can be found anywhere. During the past biennial period, owing to our wonderful prosperity and development, the number of physicians in the Territory has nearly been doubled; and yet the percentage in proportion to the population is far from being as large as in the older States. Many excellent fields for practice yet remain open, and the honest capable physician can still find lucrative fields of practice.

PHARMACY.

The last report of the president of the Territorial board of pharmacy shows that there were in the Territory at that time 156 registered

pharmacists, and 85 general merchants located 10 miles or more from a registered pharmacist had been granted permits to sell certain common drugs, patent medicines, and bottled goods under regulations prescribed by the board of pharmacy.

The druggists of the Territory are organized into an active pharmaceutical association, which cooperates with the board of pharmacy in every way.

DENTISTRY.

The last report of the secretary of the Territorial board of dental examiners shows the laws regulating the practice of dentistry to be well enforced and their workings to be generally satisfactory.

THE PRESS.

Oklahoma from the first day of her history has had newspapers of whose enterprise and progressiveness her citizens have been proud. There are published in the Territory at this time 10 daily and 122 weekly newspapers and 18 monthly and 1 semimonthly publications.

This makes one paper published for each 2,500 of population, a greater percentage than in most of the States of the Union.

As a rule Oklahoma citizens appreciate and patronize their newspapers, and the metropolitan papers of the large cities of the West all have large lists of subscribers in every town in the Territory. At the Territorial capital is published a metropolitan morning daily, with full Associated Press dispatches, lineotype machines, and Webb perfecting press, while three or four other dailies in the Territory carry a limited telegraph service.

It is to the press that Oklahoma owes much of her wonderful progress and upbuilding, and the people are coming to realize this fact more every day.

A full list of publications in the Territory is as follows:

Newspapers of Oklahoma.

DAILY.

Guthrie: Oklahoma State Capital, Leader.
Oklahoma City: Times-Journal, Oklahoman.
El Reno: Supper Bell.
Enid: Wave.
Shawnee: Chief, Star-Democrat.
Perry: Enterprise-Times.
Ponca: Courier.

WEEKLY.

Beaver County: Beaver—Herald; Hardesty—Herald; Kenton—Cimarron News.
Blaine County: Watonga—Republican; Geary—Bulletin; Okeene—Eagle.
Canadian County: El Reno—News, Democrat, Globe, Bell, Volksblatt (German); Okarche—Times; Yukon—Weekly.
Cleveland County: Norman—Transcript, Democrat-Topic, Voice; Lexington—Leader, "Y Alls."
Custer County: Arapahoe—Clarion, Bee; Weatherford-Democrat, Republican, Chronicle.
Day County: Grande—Day County Tribune.
Dewey County: Taloga—Advocate, Times.
Garfield County: Enid—Sun-Eagle, Democrat, Coming Events, Wave; Waukomis—Hornet, World.
Grant County: Pond Creek—Vidette, News; Jefferson—Rustler; Medford—Patriot, Star; Wakita—Herald; Manchester—Journal.

Greer County: Mangum—Monitor, Star, Sun; Altus—Plaindealer.
Kay County: Newkirk—Republican-News-Journal, Democrat, Populist, Herald; Ponca City—Courier, Democrat; Tonkawa—Salt Fork Valley News; Blackwell—Times-Record, Sun; Nardin—Star; Braman—World-Democrat.
Kingfisher County: Kingfisher—Free Press, Times, Reformer; Hennessey—Clipper, Kicker, Democrat.
Lincoln County: Chandler—Democrat and Telegram, News, Publicist; Stroud—Messenger, Star; Wellstown—News; Tryon—Mercury; Carney—Enterprise.
Logan County: Guthrie—State Capital, Leader, Register, Oklahoma Christian, Guide, Constitution; Mulhall—Enterprise; Orlando—Herald; Langston—Herald.
Noble County: Perry—Sentinel, Enterprise-Times, Republican.
Oklahoma County: Oklahoma City—Times-Journal, Oklahoman, Champion, India-Okla Methodist, Farmer; Edmond—Republican, Sun-Democrat; Luther—Register.
Pawnee County: Pawnee—Times-Democrat, Courier, Dispatch; Cleveland—Triangle.
Payne County: Stillwater—Gazette, Populist, Democrat; Perkins—Journal; Cushing—Herald.
Pottawatomie County: Tecumseh—Republican, Democrat; Shawnee—Democrat, Quill; McLoud—Sunbeam; Keokuk Falls—Keokuk Kall; Earlsboro—Plain-people.
Roger Mills County: Cheyenne—Sunbeam.
Washita County: Cloud Chief—Herald-Sentinel, Beacon; Cordell—Messenger; Oakdale (Mountain View)—Progress.
Woods County: Alva—Courier, Pioneer, Review; Cleo—Chieftain; Carwile—Journal; Lahoma—Sun; Augusta—News.
Woodward County: Woodward—News, Bulletin.
Osage Reservation: Pawhuska—Osage Journal.

SEMIMONTHLY.

Woodward—Live Stock Inspector.

MONTHLY.

Guthrie—Oklahoma Sunday School Worker, Oklahoma Churchman, Oklahoma Medical Journal, Practical Pointers, Sawyer's Review, Baptist Visitor.
Oklahoma City—Home, Field and Forum, Southwest Woodman, Oklahoma School Herald, McMaster's Magazine.
Norman—University Umpire.
Stillwater—Oklahoma Workman, College Paper.
Ponca City—I. O. O. F. Journal.
Woodward—Western School Journal.
Mangum—Greer County School Journal.
El Reno—School Visitor.

TERRITORIAL LIBRARY.

By an act of the Territorial legislature in 1893 the Territorial library was created and placed under the supervision of the justices of the supreme court. Although the act creating the library provided for a general library, up to this time only the law section has received attention. Appropriations have been somewhat small, but there are at the present time about 6,000 volumes in the library.

In view of the fact that a number of the Territories have received appropriations from Congress to aid in establishing and building up their libraries, I desire to renew my recommendation of a year ago that Congress make a like appropriation for Oklahoma.

IMMIGRATION.

The first coming of settlers to Oklahoma was like the dash of a great storm wave, but during the last two years the immigration has been with the steadiness and sureness of the slowly incoming tide.

Not a day during the year but the white-topped prairie schooner can be seen wending its way from north, south, east, or west toward a new abiding place in Oklahoma; every train brings newcomers to the cities, towns, or farms of the Territory.

The great crops of the three years past have turned the tide of homeseekers from every part of the nation toward Oklahoma, and from every walk in life they come to find a welcome and a home in this new country, soon to become identified with its bustle and its progress and to partake of its general prosperity. Thousands of people are coming in on homeseekers' excursions this summer to look at the Territory, and a great majority of them will, I believe, decide to stay. Fully 30,000 people have come into the Territory the past year from the different States of the Union and probably twice as many will come the next year.

The immigration is of a good character—farmers who have sold out in the North or the South to purchase new farms here where they will escape the extremes of those sections; business and professional men seeking locations in the growing cities of the Territory; men of means seeking investments; industrious laborers seeking homes and a competency. Oklahoma has room for all and extends an invitation to the thousands in all parts of the nation who are dissatisfied with their surroundings and desire to better their condition.

THE COURTS.

The new business of the courts of the Territory is proportionately lighter than it has been in the past. The judges and other court officers have worked expeditiously during the past year, and in a majority of the counties the dockets have been cleared of the accumulation of old business.

The business of the supreme court grows larger each year, however, and more and more is felt the need of a separate and distinct supreme bench in place of the present system, under which judges sit both on the district and the supreme benches.

From information furnished by the several clerks of the courts, I give below a statement showing the business transacted in the supreme court and in each of the district courts of the Territory.

SUPREME COURT.

Number of cases docketed during the year	165
Number of cases disposed of	186
Total number of cases on docket June 30, 1899	110

DISTRICT COURTS.

First district:	
Number of cases docketed during the year	662
Number of cases disposed of	756
Total number of cases on docket June 30, 1899	268
Second district:	
Number of cases docketed during the year	727
Number of cases disposed of	645
Total number of cases on docket June 30, 1899	340
Third district:	
Number of cases docketed during the year	445
Number of cases disposed of	659
Total number of cases on docket June 30, 1899	536
Fourth district:	
Number of cases docketed during the year	847
Number of cases disposed of	685
Total number of cases on docket June 30, 1899	400
Fifth district:	
Clerk of the court failed to make any report.	

As an important measure in the interest of good government I renew the suggestion made in my report for 1897, recommending the establishment of an appellate or supreme court for Oklahoma and the Indian Territory.

CRIMES AND PUNISHMENTS.

There are in the Territorial penitentiary at this time 168 convicts. This is one convict for each 2,100 of population; a smaller percentage than Ohio, Indiana, Kansas, Pennsylvania, New York, and many other States.

The number received at the penitentiary during the year was 103 (one being recaptured who had previously escaped); the number discharged was 90, of whom 60 were pardoned; 3 died, 1 escaped, and 5 were returned for new trials by order of court; making a net gain of 13 prisoners for the year.

The number of prisoners from each county is as follows:

County.	No. of convicts.	County.	No. of convicts.
Beaver		Logan	34
Blaine	9	Noble	9
Canadian	14	Oklahoma	5
Cleveland	4	Pawnee	6
Custer		Payne	20
Dewey		Pottawatomie	11
Day		Roger Mills	
Garfield	8	Washita	3
Grant	4	Woods	6
Greer	2	Woodward	4
Kay	11		
Kingfisher	9	Total	168
Lincoln	9		

The following table shows the different crimes for which the prisoners were sentenced, the number for each crime, the length of sentences, and the average sentence.

	Number of convictions.	Term of sentence.															Average sentence (years)
		Life.	50 years.	20 years.	15 years.	12 years.	10 years.	8 years.	7 years.	6 years.	5 years.	4 years.	3 years.	2 years.	1 year.	Less than one year.	
Murder	14	13	1														(1)
Manslaughter	10			1	1	2	3					2		1			10
Assault to kill	5								1		1		1		2		3
Rape	4					2			1		1						10
Assault to rape	3								1		1						5
Homicide	1											1					4
Highway robbery	8	2					4								2		(1)
Incest	1									1							6
Perjury	2										2						5
Forgery	6									1	1				4		24
Burglary	32								2		7	2	9	11	1		3
Seduction	1														1		1
Bigamy	1												1				3
Felonious assault	1														1		1
Larceny	69							1	2	3	3	12	14	12	20	2	3
Fraud	6								1					1	4		2
Assault with weapon	3														2	1	1
Receiving stolen property	1												1				3
Total	168	15	1	1	3	2	7	1	8	5	16	17	27	25	37	3	

[1] Can not be averaged because of life sentence.

The Territory has not as yet seen fit to erect a penitentiary of her own, and the convicts are cared for in the Kansas State penitentiary at Lansing, Kans., under contract, the Territory paying 35 cents per day for each convict, and the Territorial prisoners are treated in every way as are those of Kansas.

The expense to the Territory for the year has been:

Transportation of convicts	$3,144.50
Care and keeping	20,634.00
Total	23,778.50

This is an increase of $5,557.32 over the preceding year, the greatest part of the increase being due to the fact that the 35-cent rate is an increase of 10 cents per day over the rate heretofore paid by the Territory for the keeping of her prisoners.

Most of the pardons granted by me have been in cases of young persons and those of previous good character and were granted just before the expiration of the terms of sentence for the purpose of restoring citizenship and giving the prisoner a new start in the race of life, and in every one of these cases the prisoner was favorably recommended by the warden of the prison for good behavior.

In other cases great caution has been exercised and no pardon granted except for good cause and sound reason appealing to the best judgment of the executive.

A careful examination of the court proceedings and newspapers of the Territory convinces me that crime of all kinds is not increasing in the Territory. There have been no attempts at mob violence during the year, and it is a fact well worth noting that at no time in the ten years' history has it been found necessary for the chief executive to call out the militia or the peace officers to organize posses to suppress unlawful uprisings.

YOUTHFUL CRIMINALS AND INCORRIGIBLES.

Many very young boys have been sent to the penitentiary and jails for the commission of offenses against the laws of the Territory. Provision was made authorizing the governor to contract with suitable institutions for the detention and discipline of this class of offenders, but the regulations of most of the States near by us prohibit such contracts, and so it has been impossible to make any contract with them, and, owing to lack of definite appropriation, other States do not receive favorably any proposition from the Territory.

It is a crime against justice to send these youthful offenders for a first, and generally a trivial, offense, usually induced by bad associates, to a penitentiary, there to consort with and learn the ways of hardened criminals, and I called the attention of the legislature to the matter at the last session and urged action. The matter was also strongly urged by the judges of the courts, but the assembly did not see fit to give it any attention.

PUBLIC BUILDINGS.

Oklahoma as a Territory has no public buildings except the magnificient educational structures at Norman, Edmond, Stillwater, Alva, and Langston, which are spoken of under the head of higher institutions of learning. The location and construction of a capitol building, penitentiary, insane and other asylums, etc. has been deferred by

common consent until statehood has been attained or at least until such time as the lines of the future great State of Oklahoma shall have been definitely determined. When the Cherokee strip was opened to settlement sections 33 in each Congressional township was reserved for public building purposes, and this land has since been leased under authority of the Interior Department, the proceeds up to July 1, 1899, aggregating $75,587.72, which is held in the Territorial treasury as a public building fund and available whenever the legislature locates and provides for the erection of such buildings. Under an act of the legislative assembly of 1897 this money was invested in general-fund warrants of the Territory and the fund thus perceptibly increased by the interest paid on the warrants, but the last legislature repealed this law. The fund is now increasing about $20,000 a year from the leasing receipts.

CITIES.

Under the provisions of the Territorial law when any town of the Territory attains a population of 2,500 it shall become a city of the first class, by proclamation of the governor, upon petition of a majority of the voters. At the beginning of this year there were eight cities of the first class in the Territory, to wit: Guthrie, Oklahoma City, Shawnee, El Reno, Kingfisher, Enid, Pond Creek, and Perry.

During the year Weatherford, Stillwater, and Ponca City attained the requisite population and were advanced to the same rank. The cities of the Territory are well governed, have police and fire protection, waterworks, electric lights, excellent schools, good sidewalks and streets, and the population of each is increasing very rapidly. The tax rates are not excessive, municipal business is conducted largely on a cash basis, and manufacturing and industrial enterprises of all kinds are being fostered and encouraged.

A number of the cities have parks; streets are being planted to shade trees, and the enjoyment, comfort, and health of the people is being generally looked after. The number of town lots listed for taxation, together with their valuation in each county of the Territory, is as follows:

County.	Town lots listed for taxation.	Value.	County.	Town lots listed for taxation.	Value.
	Number.			*Number.*	
Beaver	2,101	$4,147	Logan	12,261	$967,297
Blaine	2,978	32,180	Noble	3,484	237,015
Canadian	4,165	360,058	Oklahoma	8,519	1,295,785
Cleveland	9,219	280,000	Pawnee	2,431	105,080
Custer	4,967	95,305	Payne		195,428
Dewey	1,785	8,046	Pottawatomie	10,658	406,475
Day	84	2,082	Roger Mills	1,156	17,085
Garfield	5,631	178,675	Washita		21,088
Grant	5,271	109,175	Woods	2,681	83,801
Greer	985	32,998	Woodward	1,726	77,605
Kay	14,157	465,085			
Kingfisher	5,865	250,568	Total		5,424,662
Lincoln	6,940	209,786			

INDUSTRIAL AND COMMERCIAL PROGRESS OF CITIES.

Oklahoma towns and cities are all progressive and enterprising communities, striving to build up themselves and the country around them.

I recently addressed communications to the mayors and the secretaries of the commercial clubs of 22 of the leading towns of the Territory asking for full information upon the subjects of manufacturing, building, wholesale establishments, public improvements, etc., and from the answers received have compiled the following interesting tables and statements:

Manufacturing, commercial, and building statistics.

Town.	Manufacturing establishments.		Wholesale houses.		Business buildings in course of erection.	Residences in course of erection.
	Number.	Hands employed.	Number.	Hands employed.		
Alva	2	17	2	28	2	23
Blackwell	4	30			10	50
Chandler	2	50	2	20	6	10
El Reno	9	200	8	75	2	25
Enid	7	50	3	15	8	29
Guthrie	15	185	7	50	10	20
Hennessy	3	25	3	30	3	12
Kingfisher	9	65	7	49	5	15
Medford	2	11	1	7	1	6
Newkirk	7	27	2	8	4	6
Norman	3	25			2	5
Oklahoma City	25	400	30	300	20	100
Pawnee	3	15			3	6
Perry	5	50	3	25	3	30
Ponca	7	252	7	45	5	23
Pond Creek	2	26				20
Shawnee	10	250	2	200	7	21
Stillwater	3	25	2	15	4	12
Stroud	6	75	6	10	10	25
Tecumseh	5	20				5
Weatherford	5	100	8	100	10	28
Woodward	4	8	3	20	4	6
Total	138	1,921	96	815	124	471

PUBLIC IMPROVEMENTS IN PROGRESS.

Alva: Dormitory for normal students.
Blackwell: Opera house to cost $30,000; school building; waterworks.
Chandler: A $10,000 school building.
Enid: Electric light and waterworks.
Guthrie: Oil well; $30,000 opera house; $20,000 Masonic temple; 1 mile of brick and stone pavements.
Hennessy: Parks; fair grounds.
Kingfisher: College building and large dormitory.
Norman: Improving water system.
Oklahoma: Curbing, guttering, and grading streets; extension of water system.
Perry: City building; opera house.
Ponca: Four thousand dollar stone schoolhouse; sidewalks and stone crossings; improvements of parks.
Pondcreek: Telephone system.
Shawnee: Waterworks.
Stillwater: Telephone system; laboratory and library buildings at college.
Stroud: School building; waterworks.
Weatherford: Waterworks; electric lights.
Woodward: Parks; public library,

COUNTIES.

I believe, upon the whole, the financial and business affairs of the different counties of the Territory are better managed than in times past. In many of the counties there was much mismanagement in their early history, resulting in the piling up of considerable debt with but little to show for it; but these debts have all been funded

CANADIAN COUNTY VINEYARD.

into long-time, low-interest bonds, and the counties are now conducted on a cash basis. With the better management now prevalent, the increase in taxable wealth, and the proving up of Government lands heretofore untaxed, the tax rate in every county is being reduced each year.

A majority of the counties have good court-houses, and the others are arranging to build, and many contemplate putting up better jails, in order to prevent jail breaks, which have been somewhat frequent the past year. Good roads are being established and the streams bridged as fast as the income of the counties will allow.

The court expenses, which have been a burden upon many counties, are being greatly reduced.

I give below in a brief synopsis the condition of each county in the Territory, with such information as it seems to me would be desirable to persons coming to the Territory to locate.

Beaver County.—Location, extreme northwest; area, 3,681,000 acres; population, 2,548; taxable valuation, $1,341,264; county bonded debt, $17,500; county tax levy, 9.2 mills; number of school districts, 42; number of school children, 873; school land in county, 1,352 quarter sections; Government land subject to homestead entry, 3,232,011 acres; county seat, Beaver; other leading towns, Hardesty and Kenton; principal occupation of people, stock raising; products, cattle, sheep, and horses; undeveloped resources, sheep range, fruit growing by irrigation, and mining; some copper now being mined in western end of county.

Blaine County.—Location, middle west; area, 593,000 acres; population, 8,527; taxable valuation, $505,711; county bonded debt, $38,000; county tax levy, 39 mills; number of school districts, 80; number of school children, 2,472; school land in county, 200 quarter sections; Government land subject to homestead entry, 14,240 acres; county seat, Watonga; other leading towns, Geary and Okeene; principal occupation of people, farming, live-stock raising, salt manufacturing; products, wheat, corn, cotton, cattle, hogs, salt; manufacturing industries, a number of small salt works evaporating salt from the brine of Salt Creek, flouring mills; undeveloped resources, salt, cement, plaster, gypsum, and building-stone deposits.

Canadian County.—Location, south central; area, 480,880 acres; population, 18,336; taxable valuation, $4,366,858; county bonded debt, $58,500; county tax levy, 21 mills; number of school districts, 96; number of school children, 4,408; school land in county, 168 quarter sections; Government land subject to homestead entry, 760 acres; county seat, El Reno; other leading towns, Okarche, Yukon, and Union; principal occupation of people, agriculture and horticulture; products, wheat, corn, cotton, fruit, melons, and potatoes; manufacturing industries, large flouring mills, cement works, cotton compress.

Cleveland County.—Location, extreme south; area, 348,000 acres; population, 15,426; taxable valuation, $1,775,142; county bonded debt, $79,000; county tax levy, 17.4 mills; number of school districts, 69; number of school children, 5,774; school land in county, 122 quarter sections; Government land subject to homestead entry, no acres; county seat, Norman; other leading towns, Lexington, Noble, and Moore; principal occupation of people, agriculture and horticulture; products, wheat, corn, cotton, fruit, fat cattle; manufacturing industries, cotton-seed oil mill, good flouring mills, stone quarries.

Custer County.—Location, central west; area, 647,000 acres; population, 6,482; taxable valuation, $1,951,638; county bonded debt, $40,500; county tax levy, 28 mills; number of school districts, 52; number of school children, 2,183; school land in county, 224 quarter sections; Government land subject to homestead entry, 46,220 acres; county seat, Arapahoe; other leading towns, Weatherford and Independence; principal occupation of people, farming and stock raising; products, wheat, corn, cotton, hogs, and cattle; manufacturing industries, flouring mills; undeveloped resources, building stone.

Day County.—Location, extreme west; area, 666,000 acres; population, 843; taxable valuation, $399,668; county bonded debt, $7,500; county tax levy, 24 mills; number of school districts, 13; number of school children, 364; school land in county, 240 quarter sections; Government land subject to homestead entry, 530,520 acres; county seat, Grande; other leading towns, Ioland and Texmo; principal occupation of people, stock raising; products, cattle and hogs, corn, kaffir corn and cane, some wheat, and cotton on small scale.

Dewey County.—Location, north middle west; area, 628,000 acres; population, 4,129; taxable valuation, $469,966; county bonded debt, $8,450; county tax levy, 18 mills; number of school districts, 42; number of school children, 1,444; school land in county, 224 quarter sections; Government land subject to homestead entry, 163,570 acres; county seat, Taloga; other leading towns, Seiling and Butte; principal occupation of people, farming and stock raising; products, corn, wheat, cattle, and hogs.

Garfield County.—Location, north central; area, 640,000 acres; population, 16,223; taxable valuation, $2,084,001; county bonded debt, $46,000; county tax levy, 27.6 mills; number of school districts, 134; number of school children, 5,366; school land in county, 465 quarter sections; Government land subject to homestead entry, none; county seat, Enid; other leading towns, Waukomis, North Enid, and Kremlin; principal occupation of the people, farming and stock raising; products, wheat, corn, castor beans, cattle, and hogs; manufacturing industries, flouring mills.

Grant County.—Location, middle north; area, 672,000 acres; population, 14,319; taxable valuation, $1,83[illegible],615; county bonded debt, $29,000; county tax levy, 26.7 mills; number of school districts, 121; number of school children, 4,806; school land in county, 480 quarter sections; Government land subject to homestead entry, 1,120 acres; county seat, Pondcreek; other leading towns, Medford, Jefferson, and Manchester; principal occupation of the people, farming; products, wheat, corn, cattle and hogs; manufacturing industries, flouring mills.

Greer County.—Location, extreme southwest; area, 1,511,573; population, 10,[illegible]18; taxable valuation, $1,682,444; county bonded debt (no bonded debt); county tax levy, 12.9 mills; number of school districts, 71; number of school children, 3,638; school land in county, 964 quarter sections; Government land subject to homestead entry, 515,[illegible]81 acres; county seat, Mangum; other leading towns, Altus and Navajo; principal occupation of the people, farming and live-stock raising; products, cattle, wheat, corn, cotton, sheep, kafir corn, and cane; manufacturing industries, salt and cement plants; undeveloped resources, cement beds, salt deposits, and sheep raising.

Key County.—Location, northeast; area, 5[illegible],000 acres; population, 18,[illegible]80; taxable valuation, $[illegible],[illegible]71; county bonded debt, $[illegible],000; county tax levy, [illegible] mills; number of school districts, [illegible]; number of school children, 5,733; school land in county, [illegible]5 quarter sections; Government land subject to homestead entry, none; county seat, Newkirk; other leading towns, Ponca, Blackwell, Tonkawa, and Kildare; principal occupation of the people, farming; products, wheat, corn, cattle, and hogs; manufacturing industries, flouring mills, brickyards, stone quarries, and cement works; undeveloped resources, stone quarries, cement beds, fruit and vegetable raising.

Kingfisher County.—Location, central; area, [illegible],000 acres; population, 16,044; taxable valuation, $[illegible],[illegible]; county bonded debt, $[illegible],000; county tax levy, 17.5 mills; number of school districts, [illegible]; number of school children, 5,739; school land in county, [illegible] quarter sections; Government land subject to homestead entry, [illegible] acres; county seat, Kingfisher; other leading towns, Hennessey, Dover, and Downs; principal occupation of the people, farming and stock raising; products, wheat, corn, cotton, kafir corn, cattle, hogs, and fruit; manufacturing industries, flouring mills and creamery.

Lincoln County.—Location, middle east; area, [illegible],[illegible]40 acres; population, 21,884; taxable valuation, $[illegible],[illegible]; county bonded indebtedness, $[illegible],000; county tax levy, [illegible].7 mills; number of school districts, [illegible]; number of school children, 7,[illegible]; school land in county, [illegible] quarter sections; Government land subject to homestead entry, [illegible] acres; county seat, Chandler; other leading towns, Stroud, Wellston, and Carney; principal occupation of the people, farming and fruit raising; products, corn, cotton, peanuts, fruit, cattle, and hogs; manufacturing industries, oil mill, cotton gins and flouring mills; undeveloped resources, cement beds and timber.

Logan County.—Location, east central; area, [illegible],[illegible]40 acres; population, 23,589; taxable valuation, $[illegible],[illegible]; county bonded debt, $[illegible],000; county tax levy, 10 mills; number of school districts, [illegible]; number of school children, 7,188; school land in county, 185 quarter sections; Government land subject to homestead entry, [illegible] acres; county seat, Guthrie; other leading towns, Marshall, Orlando, and Langston; principal occupation of the people, farming and mercantile pursuits; products, wheat, corn, castor beans, broom-corn and fruit; manufacturing industries, flouring mills, oil mill, cotton gins, creamery, cheese factory, and ice plant.

Noble County.—Location, northeast; area, [illegible],000 acres; population, 10,421; taxable valuation, $[illegible],[illegible]; county bonded debt, $[illegible],000; county tax levy, 21.5

Dewey County.—Location, north middle west: area, 638,000 acres; population, 4,129; taxable valuation, $498,995; county bonded debt, $8,450; county tax levy, 18 mills; number of school districts, 48; number of school children, 1,444; school land in county, 224 quarter sections; Government land subject to homestead entry, 163,570 acres; county seat, Taloga; other leading towns, Seiling and Butte; principal occupation of people, farming and stock raising; products, corn, wheat, cattle, and hogs.

Garfield County.—Location, north central; area, 640,000 acres; population, 16,223; taxable valuation, $2,034,001; county bonded debt, $46,000; county tax levy, 27.6 mills; number of school districts, 124; number of school children, 5,266; school land in county, 465 quarter sections; Government land subject to homestead entry, none; county seat, Enid; other leading towns, Waukomis, North Enid, and Kremlin; principal occupation of the people, farming and stock raising; products, wheat, corn, castor beans, cattle, and hogs; manufacturing industries, flouring mills.

Grant County.—Location, middle north; area, 672,000 acres; population, 14,819; taxable valuation, $1,820,615; county bonded debt, $29,000; county tax levy, 26.7 mills; number of school districts, 121; number of school children, 4,808; school land in county, 480 quarter sections; Government land subject to homestead entry, 1,120 acres; county seat, Pondcreek; other leading towns, Medford, Jefferson, and Manchester; principal occupation of the people, farming; products, wheat, corn, cattle and hogs; manufacturing industries, flouring mills.

Greer County.—Location, extreme southwest; area, 1,511,575; population, 10,132; taxable valuation, $1,622,404; county bonded debt (no bonded debt); county tax levy, 12.9 mills; number of school districts, 71; number of school children, 3,628; school land in county, 964 quarter sections; Government land subject to homestead entry, 518,291 acres; county seat, Mangum; other leading towns, Altus and Navajo; principal occupation of the people, farming and live-stock raising; products, cattle, wheat, corn, cotton, sheep, kaffir, corn, and cane; manufacturing industries, salt and cement plants; undeveloped resources, cement beds, salt deposits, and sheep raising.

Kay County.—Location, northeast; area, 573,000 acres; population, 18,000; taxable valuation, $2,192,071; county bonded debt, $35,000; county tax levy, 12 mills; number of school districts, 88; number of school children, 5,733; school land in county, 325 quarter sections; Government land subject to homestead entry, none; county seat, Newkirk; other leading towns, Ponca, Blackwell, Tonkawa, and Kildare; principal occupation of the people, farming; products, wheat, corn, cattle, and hogs; manufacturing industries, flouring mills, brickyards, stone quarries, and cement works; undeveloped resources, stone quarries, cement beds, fruit and vegetable raising.

Kingfisher County.—Location, central; area, 493,570 acres; population, 16,044; taxable valuation, $2,086,002; county bonded debt, $35,000; county tax levy, 17.5 mills; number of school districts, 120; number of school children, 5,720; school land in county, 200 quarter sections; Government land subject to homestead entry, 190 acres; county seat, Kingfisher; other leading towns, Hennessey, Dover, and Downs; principal occupation of the people, farming and stock raising; products, wheat, corn, cotton, kaffir corn, cattle, hogs, and fruit; manufacturing industries, flouring mills and creamery.

Lincoln County.—Location, middle east; area, 619,000 acres; population, 21,884; taxable valuation, $1,835,070; county bonded indebtedness, $67,000; county tax levy, 20.7 mills; number of school districts, 134; number of school children, 7,800; school land in county, 623 quarter sections; Government land subject to homestead entry, no acres; county seat, Chandler; other leading towns, Stroud, Wellston, and Carney; principal occupation of the people, farming and fruit raising; products, corn, cotton, peanuts, fruit, cattle, and hogs; manufacturing industries, oil mill, cotton gins, and flouring mills; undeveloped resources, cement beds and timber.

Logan County.—Location, east central; area, 465,600 acres; population, 23,589; taxable valuation, $4,131,921; county bonded debt, $118,000; county tax levy, 10 mills; number of school districts, 97; number of school children, 7,188; school land in county, 165 quarter sections; Government land subject to homestead entry, no acres; county seat, Guthrie; other leading towns, Mulhall, Orlando, and Langston; principal occupation of the people, farming and mercantile pursuits; products, wheat, corn, castor beans, melons, and fruit; manufacturing industries, flouring mills, oil mill, cotton gins, creamery, cheese factory, and ice plant.

Noble County.—Location, northeast; area, 398,000 acres; population, 10,421; taxable valuation, $1,576,576; county bonded debt, $35,000; county tax levy, 21.5

SPORTING SCENE, IVANHOE, WOODWARD COUNTY.

mills; number of school districts, 59; number of school children, 2,991; school land in county, 192 quarter sections; Government land subject to homestead entry, no acres; county seat, Perry; other leading towns, Morrison and White Rock; principal occupation of the people, farming and mercantile pursuits; products, wheat, corn, castor beans, cattle, and hogs; manufacturing industries, flouring mills.

Oklahoma County.—Location, south central; area, 461,720; population, 20,324; taxable valuation, $4,421,699; county bonded debt, $136,900; county tax levy, 9 mills; number of school districts, 82; number of school children, 6,920, school land in county, 331 quarter sections; Government land subject to homestead entry, none; county seat, Oklahoma City; other leading towns, Edmond, Choctaw City, and Luther; principal occupation of the people, farming, mercantile pursuits, and fruit growing; products, wheat, corn, fruit, and cotton; manufacturing industries, ice plant, flouring mills, cotton compress, harness factory, shirt and overall factory, ballast and brick yards.

Pawnee County.—Location, extreme northeast; area, 333,000 acres; population, 10,795; taxable valuation, $1,600,708; county bonded debt, $15,000; county tax levy, 12.5 mills; number of school districts, 63; number of school children, 4,002; school land in county, 200 quarter sections; Government land subject to homestead entry, 1,423 acres; county seat, Pawnee; other leading towns, Cleveland and Blackburn; principal occupation of the people, farming and stock raising; products, corn, castor beans, cattle, and hogs; manufacturing industries, flouring mills and cotton gins; undeveloped resources, coal veins.

Payne County.—Location, northeast; area, 484,000 acres; population, 17,386; taxable valuation, $2,169,851; county bonded debt, $78,700; county tax levy, 12.5 mills; number of school districts, 99; number of school children, 6,065; school land in county, 198 quarter sections; Government land subject to homestead entry, none; county seat, Stillwater; other leading towns, Perkins and Cushing; principal occupation of the people, farming and stock raising; products, wheat, corn, cotton, cattle, and hogs; manufacturing industries, flouring mills, creamery, cheese factory, cotton gins; undeveloped resources, indications of coal and oil.

Pottawatomie County.—Location, extreme southeast; area, 501,000 acres; population, 22,594; taxable valuation, $1,784,448; county bonded debt, $51,500; county tax levy, 29 mills; number of school districts, 102; number of school children, 8,636; school land in county, 218 quarter sections; Government land subject to homestead entry, none; county seat, Tecumseh; other leading towns, Shawnee, McLoud, and Keokuk Falls; principal occupation of people, farming; products, cotton, corn, cattle, and hogs; manufacturing industries, railway shops, flouring mills, cotton compress, and oil mill; undeveloped resources, stone quarries.

Roger Mills County.—Location, extreme west; area, 757,000 acres; population, 2,262; taxable valuation, $679,588; county bonded debt, $9,450; county tax levy, 17.5 mills; number of school districts, 20; number of school children, 886; school land in county, 264 quarter sections; Government land subject to homestead entry, 182,120 acres; county seat, Cheyenne; other leading town, Berlin; principal occupation of the people, stock raising; products, stock feed and cattle.

Washita County.—Location, southwest; area, 628,000 acres; population, 9,468; taxable valuation $892,953; county bonded debt, $15,500; county tax levy, 19 mills; number of school districts, 61; number of school children, 3,584; school land in county, 224 quarter sections, Government land subject to homestead entry, 2,500 acres; county seat, Cloud Chief; other leading towns, Mountain View (Oakdale), Cordell, and Wood; principal occupation of the people, farming and stock raising; products, cotton, corn, Kafir corn, cattle, and hogs; manufacturing industries, flouring mills and cotton gins.

Woods County.—Location, central north; area, 1,732,000 acres; population 24,414; taxable valuation, $2,321,394; county bonded debt, $47,200; county tax levy 20.7 mills; number of school districts, 231; number of school children, 9,220; school land in county, 1,223 quarter sections; Government land subject to homestead entry, 224,028 acres; county seat Alva; other leading towns, Cleo, Augusta, and Carwile; principal occupation of the people, farming and stock raising; products, cattle, wheat, corn, Kafir corn, and cane; manufacturing industries, flouring mills.

Woodward County.—Location, northwest; area, 2,124,000 acres; population, 4,206; taxable valuation, $1,883,864; county bonded debt, $25,005; county tax levy, 19.5 mills; number of school districts, 57; number of school children, 1,509; school land in county 702 quarter sections; Government land subject to homestead entry, 1,420,110 acres; county seat, Woodward; other leading towns, Curtis and Gage; principal occupation of the people, stock raising; products, stock feed and cattle.

MILITARY POSTS.

Oklahoma has within her borders two active and two abandoned military posts.

A few indistinct ruins mark the site of the once historic Fort Cobb, on the Washita. Fort Supply, located in Woodward County, in the northwestern part of the Territory, was used by the Government as an active military station until a few years ago, when it was abandoned and the furniture, furnishings, and equipment of the post sold at auction. The scene is now one of desolation, with the buildings going to ruin and being carried off piecemeal, cattle herding not only on the reservation, but within the inclosure about the buildings and trampling even upon the walks and porches. An act of Congress donating the use of the buildings to the Territory for an insane asylum was transmitted to the legislature by myself upon receipt of a certified copy of the same from the Department, together with a message calling attention to the terms thereof and urging that some action be taken relative thereto. The assembly, however, failed to take any action. It would require the expenditure of a considerable sum of money to adapt the buildings of the post for use as an asylum for the insane, and it is questionable whether the Territory would be justified in making this expenditure without securing title to the buildings and grounds. As the fort and the 40,000 acres of reservation surrounding it are not now, nor will likely at any time, bring any income to the Government, and the buildings will, if left in their present abandoned state a few years longer, be entirely ruined, I believe that Congress should by special act donate this reservation to the Territory permanently to be used for such public purpose as may be deemed most desirable and suitable.

Fort Reno, in Canadian County, and Fort Sill, in the Kiowa and Comanche Reservation, both used as active posts, are among the attractive public places of interest in the Territory. They are well kept up by the Government and many permanent improvements constantly added. During the past year of hostilities the number of troops at each post has been smaller than at any time in their history.

OKLAHOMA IN THE WAR.

In the war with Spain Oklahoma promptly responded to the call of the President and furnished one company of cavalry composed of expert marksmen and persons used to the hardships of outdoor life and the care and management of horses. This company has since become famous as the star company of Roosevelt's Rough Riders, and were engaged in the several days' fighting in front of Santiago, where they demonstrated their skill and bravery and won laurels that will forever adorn and beautify the early history of our well-beloved Territory.

Several members of this troop were wounded in battle and deserve honorable mention at proper times and places; but one was killed while manfully and bravely charging the heights of San Juan. His body will shortly be returned to Oklahoma and buried in the city cemetery at Hennessey. A small fund was raised by popular subscription to erect a suitable monument over his grave, and the legislature, at its last session, appropriated enough to make the amount $2,000, which will pay the expense of purchasing and erecting a modest but suitable shaft which will serve to commemorate the heroic deeds

of Roy V. Cashion and to preserve and perpetuate the history of the gallant conduct of the troop to which he belonged.

Under the President's second call for troops Oklahoma was authorized to furnish one battalion, consisting of four companies of infantry. These companies were promptly enlisted and mustered into the service and were mobilized as a part of the First Regiment, Territorial Infantry, U. S. Volunteers, the regiment being composed of four companies from Arizona, three from New Mexico, and one from the Indian Territory, together with the Oklahoma battalion. The regiment was assigned to the Second Division of the First Army Corps, remained in camp at Albany, Ga., most of last winter, and, though every man in the regiment was anxious to see active duty, were finally mustered out in March.

A full roster of officers and men mustered into the service from Oklahoma is contained in my last annual report. The officers appointed and commissioned by me were selected from a large number of applicants without regard to partisan politics and from considerations of especial adaptability and ability to make good officers. They were in the service over eight months, and from the reports made by the inspector of the United States Army I am convinced that no better battalion of troops was to be found in the service. No complaint was ever made to me of any lack of food, clothing, medicines, etc., and I feel sure that everything necessary for the health and comfort of our men was amply provided.

NATIONAL GUARD.

At the time of the submission of my last annual report the national guard of the Territory was badly disorganized, a fact greatly to the credit of the gallant young men of the guard as well as the people they represent, for the demoralized condition of the militia was due wholly to the majority of the men in the ranks as well as the officers having enlisted in the Volunteer Army of the United States.

Since that time the guard has been steadily growing, there being now about 450 officers and enlisted men composing the same, with a regimental organization of nine companies and a regimental band. The companies and band are located as follows: Headquarters, band, and Company A at Guthrie; Company D, at Ponca City; Company E, at Pawnee; Company F, at Shawnee; Company G, at Kingfisher; Company I, at Newkirk; Company K, at Enid; Company B, at Chandler; Company C, at Medford.

The former Company B, located at Alva, and Company C, located at Oklahoma City, have been dismissed for having fallen below the minimum allowed by law, and their equipments have been returned. Company D, located at Ponca City, was dismissed for the same reason, but have lately been reorganized and are again upon a good footing.

All the companies are fully equipped with the undress uniform of the same pattern used in the Regular Army, and the Springfield rifle, caliber .45. Company A, in addition to the undress uniform and Springfield rifle, are equipped with leggings, blanket bags, haversacks, and canteens.

The regimental band is fully equipped with the dress, undress, and summer uniforms and necessary instruments, and are subject to the same discipline and regulations as the national guard.

The legislature appropriated $3,000 for an encampment of the guard, which will take place some time in October. As the Territorial militia

have never been together in a body it is to be hoped that the encampment this year will be productive of positive good in imparting practical instructions to the troops participating.

It is my opinion that the national guard can be safely relied upon for any ordinary emergency.

The personnel of the militia includes the best material among the young men of the Territory, and the discipline is generally good.

The staff of the commander in chief is as follows:

Bert C. Orner, adjutant-general, ex officio quartermaster-general and chief of ordnance.
James H. Wheeler, colonel, inspector-general. Oklahoma City.
Paul Jundt, major, commissary-general, Guthrie.
Richard Messal, major, paymaster-general, Enid.
Mathias J. Holt, major, judge-advocate-general, Blackwell.
Samuel A. Mann, captain, aid-de-camp, Guthrie.
Bert C. Maine, captain, aid-de-camp, Guthrie.
Otto R. Montgomery, captain, aid-de-camp, Guthrie.

OKLAHOMA AT THE OMAHA EXPOSITION.

The exhibit of Oklahoma products at the Tran-Mississippi and International Exposition at Omaha, Nebr., was of great value to the Territory. It compared favorably in many respects and was superior in some to the exhibits of the many Western States represented there. The Territorial exhibit occupied a space on the ground floor of the agricultural building, 50 by 28 feet, and 24 feet high, inclosed in an ornamental booth. It was purely an agricultural and horticultural exhibit, receiving in addition to ten premiums for products a silver medal for the beauty and decorative art of the display. The chief staples exhibited were corn, cotton, and wheat, in the production of each of which the Territory stands well in the front ranks. There was a pyramid of cotton bales, a natural crib of corn, and bins of wheat that could not only be seen but handled. Second in importance were castor beans and Kaffir corn.

The exhibit also received a premium for the greatest variety of products shown. Among the interesting things were cornstalks 19 feet high; native grasses 16 and samples of weeds 21 feet; a castor bean stalk, 6 inches in diameter and 13 feet high; apples, 20 ounce pippins; cotton stalks 7½ feet tall, containing as high as 200 bolls; rattlesnake cucumbers 5 feet long; pumpkins, squashes, and beets of mammoth size.

The exhibit had during the summer all cereals and fruits in their season. A continual supply of fruits was kept up—apples, peaches, plums, pears, grapes, apricots, etc. Several carloads of melons were received and served to the visitors on a day designated as "melon day," thousands being astonished at the size and delicious flavor of Oklahoma melons. Fine exhibits were also made from the Indian schools at Darlington and Seger, showing the agricultural and industrial progress made by the Indians in the western part of the Territory. The flouring mills of the Territory had on exhibition all varieties of flour from native wheat, on which a number of premiums were received.

The exhibit attracted much attention; thousands of visitors saw and handled the products of the Territory every day and were favorably impressed.

As many visitors day after day declared their intention of going to the Territory, an immigration bureau was started by private parties in conjunction with the exhibit to which much of the present influx of farmers coming to the Territory is due.

CUSTER COUNTY CORN EXHIBIT.

WHAT ONE FARM PRODUCED.

During the last two months of the exposition 50,000 copies of my last annual report were distributed to people anxious to learn more of Oklahoma and her wonderful progress.

LIST OF AWARDS.

Following is the list of awards to the Territorial exhibits:

Oklahoma Territory, silver medal for State agricultural exhibit.
Oklahoma Territory, silver medal for bean exhibit.
Oklahoma Territory, silver medal for grain exhibit.
Oklahoma Territory, silver medal for cotton exhibit.
Eagle Mills, Edmond, gold medal for soft-wheat flour.
Eagle Mills, Edmond, gold medal for hard-wheat flour.
Ponca City Roller Mills, silver medal for Oklahoma flour.
Perry Mill Company, silver medal for Oklahoma flour.
Hennessy Roller Mills, gold medal for "Perfection" flour.
Kingfisher Milling Company, gold medal for Oklahoma flour.
Oklahoma Mill Company, Kingfisher, gold medal for Oklahoma flour.
Canadian Milling Company, El Reno, bronze medal for Oklahoma flour.
Elreno Mill and Elevator Company, silver medal for Oklahoma flour.

OFFICIAL ROSTER.

There have been a few changes in officials of the Territory during the year and the official roster is now as follows:

Governor: Cassius M. Barnes.
Private secretary to the governor: Fred L. Wenner.
Secretary of the Territory and ex officio lieutenant-governor: W. M. Jenkins.
Assistant secretary: J. J. Houston.
Attorney-general: Harper S. Cunningham.
Treasurer: Frank M. Thompson.
Superintendent of public instruction and ex officio auditor: S. N. Hopkins.
Secretary school land board and ex officio school land commissioner: Charles H. Filson.
Assistant secretary: Joseph H. Norris.
Oil inspector: Amos A. Ewing.
Bank commissioner: John M. Pugh.
Librarian: George H. Dodson.
Deputy auditor: E. P. McCabe.
Adjutant-general: Bert C. Orner.
Grain inspector: C. T. Prouty.
Game warden: Daniel R. Widmer.
Superintendent of public health: L. Haynes Buxton.
Delegate in Congress: D. T. Flynn.
Territorial school land board: Governor Barnes, Secretary Jenkins, and Auditor Hopkins.
Board of railway assessors: Governor Barnes, Secretary Jenkins, and Auditor Hopkins.
Board of equalization: Governor Barnes, Secretary Jenkins, and Auditor Hopkins.
Regents of the Territorial university: Governor Barnes; Henry E. Asp, Guthrie; C. L. Bottsford, Norman; C. O. Blake, El Reno; G. W. Bellamy, El Reno; L. P. King, Wellston,
Regents of the Agricultural and Mechanical College: Governor Barnes; Frank J. Wikoff, Stillwater; C. J. Benson, Shawnee; J. P. Gandy, Alva; J. C. Tousley, Weatherford; J. D. Ballard, Weatherford.
Live-stock sanitary commission: Same as the regents of the Agricultural and Mechanical College.
Board of education of normal schools: Superintendent of Public Instruction Hopkins, Treasurer Thompson; D. P. Marum, Woodward; L. J. Gunn, El Reno; D. D. Leach, Oklahoma City.
Board of regents of colored agricultural and normal university: Superintendent of Public Instruction Hopkins, Treasurer Thompson; Rev. L. H. Holt, Guthrie; E. O. Tyler, Kingfisher; P. F. Tyler, Watonga.
Territorial board of education: Superintendent of Public Instruction Hopkins; President D. R. Boyd, of Norman; President E. D. Murdaugh, of Edmond; Prof. B. F. Nihart, of Oklahoma City; Prof. G. D. Moss, Kingfisher.

The levying of county taxes upon property in reservations by the counties to which the reservations were attached for judicial purposes has caused considerable agitation during the year, and the legislative assembly at its recent session passed an act relieving the reservations of all tax except the Territorial and court taxes. There is still much agitation upon this subject in the Osage Reservation, where there is a strong sentiment in favor of having the reservation created a separate county.

No Indian reservations have been opened to settlement during the year, though it was hoped that the reservation occupied by the Wichita and affiliated tribes would be thrown open. This reservation was treated for in 1890, and in the spring of 1891, when the Cheyenne and Arapahoe Reservation was opened, so certain was the Secretary of the Interior that this reservation was to follow within the year that he designated it as County I, located the county seat, which was named Wilber, and a postmaster was appointed therefor. But the expected opening did not materialize, and owing to some legal technicalities the allotment of lands to the tribes on this reservation has never been completed. During the year the C. O. and G. Railway has built across the northern end of this reservation, and the Rock Island extension up the beautiful Washita Valley runs just on the southern border. With such excellent railway communication, rich soil, timbered hills and grass-laden valleys, fine streams, and beautiful scenery, this reservation would soon make one of the most populous and prosperous counties of the Territory, and I sincerely hope that the Department may see its way clear to carry out the treaty and open the land to settlement this coming year.

The building of two lines of railway into the Kiowa and Comanche country turns many longing eyes toward its fertile acres, in extent enough for a small empire. Here are the famous Wichita Mountains, with their rumored mineral wealth, and the people of the entire Southwest will soon make a united demand on Congress to open this great area to the pursuits and arts of civilization.

During the year a controversy has arisen over the possession of certain school lands along the northern boundary of the Kiowa, Comanche, and Apache reservations. The proclamation of the President opening the Cheyenne and Arapahoe Reservation in 1891, in defining the southern boundary of the reservation, did not coincide with the boundaries given in the Indian treaties, and there has been a narrow strip of land in controversy since. Settlers have been living upon the land, and, although the Department has never recognized their rights, it has refrained from ejecting them. The Territory was granted sections 16 and 36 of each Congressional township of the land opened for settlement, and the school-land department has always been guided by the President's proclamation and leased the land accordingly. Some months ago, owing to unsettled titles in the vicinity, a town was built upon a school section at the terminus of the Rock Island extension west from Chickasha. This land is held under lease from the Territorial school-land board, who leased only land embraced within the boundaries defined in the President's proclamation, but the Indian Bureau claims that part of this school section is in the Kiowa and Comanche Reservation and seeks to dispossess the lessees.

Some action should be taken to amicably adjust these differences and establish permanently, by a correct survey, these disputed boundaries.

STATEHOOD.

It is the earnest wish of a large number of our intelligent and influential citizens that a State government be accorded to Oklahoma without further delay. The platforms of all political parties at their latest conventions have declared in favor of statehood upon such terms and with such boundaries as Congress may in its wisdom see fit to prescribe, and, tested by the standards that have heretofore prevailed in the admission of new States, Oklahoma is certainly entitled to all the rights and privileges of a State government. No fair-minded man can read the foregoing report of the opening, settlement, and development of this Territory without being convinced of the truth of this statement.

And yet there are many thoughtful people who have invested their capital and made their homes here who believe that it would be to the best interest of all, both now and for the years to come, to wait until such time as the Indian Territory, lying to the east and south of Oklahoma, can be united with us in one strong and wealthy commonwealth. We realize the fact that immediate statehood with our present boundaries would largely increase the expense of government, and that the additional burden must be borne by the taxpayers. At the present time only about one-fifth of the land entered and taken for homesteads has been patented and placed upon the lists of taxable property; and this constitutes less than one-fourth of the taxable valuation, showing that the burden of expense of the Territorial government is now borne by the railroads and by the property in the cities and towns. The present taxation averages from 4 to 5 per cent per annum upon an assessed valuation of about 60 per cent of the actual cash value. To create a State of Oklahoma with its present boundaries would necessarily more than double the expense of government without commensurate benefit, and I agree with the larger and more conservative part of our people that it is better to wait a reasonable time and eventually, by a union of the two Territories, establish one grand State which would be a pride and gratification to its people for generations.

Respectfully submitted.

C. M. BARNES, *Governor.*

The SECRETARY OF THE INTERIOR,
Washington, D. C.

Presidents of the Territorial institutions of learning: D. R. Boyd, Norman, of the Territorial university; E. D. Murdaugh, Edmond, of the Oklahoma normal school; J. C. Ament, Alva, of the Northwestern Normal; A. C, Scott, Stillwater, of the Agricultural and Mechanical College; Inman E. Page, Langston, of the colored university.

Board of health: Auditor Hopkins; Dr. L. Haynes Buxton, Oklahoma City; Dr. F. S. Hamilton, Norman.

Board of pharmacy: F. B. Lillie, Guthrie; C. N. Dow, Pond Creek; E. E. Howendobler, Perry.

Board of dental examiners: W. E. Furrow, Guthrie; Robert Wilson, El Reno; E. E. Kirkpatrick, Oklahoma City; J. Q. Waddell, Kingfisher; L. A. Kelsy; Chandler.

Supreme court: Chief justice, J. H. Burford, Guthrie; associate justices, C. E. Erwin, El Reno; B. F. Burwell, Oklahoma City; B. T. Hainer, Perry; J. L. McAtee, Enid. These judges also serve as judges of the district court in the first to fifth districts, respectively.

Clerks of courts: Supreme court, B. F. Hegler, Guthrie; first district, M. C. Hart, Guthrie; second district, W. S. Hunter, El Reno; third district, Byron H. Shear, Oklahoma City; fourth district, J. E. Pickard, Perry; fifth district, J. P. Renshaw, Pondcreek.

FEDERAL OFFICERS.

United States district attorney: S. L. Overstreet.

Assistant United States attorneys: John H. Scothorn and B. S. McGuire.

United States marshal: C. H. Thompson.

Registers and receivers of United States land offices: Guthrie, J. J. Boles and F. E. McKinley; Oklahoma City, S. S. Price and A. H. Classon; Kingfisher, E. E. Brownlee and J. V. Admire; Enid, J. B. Cullison and J. J. S. Hassler; Perry, A. H. Boles and J. R. Scott; Alva, R. A. Cameron and W. J. French; Woodward, F. S. Healy and J. W. Miller; Mangum, H. D. McKnight and James Kelly.

United States Indian agents: Osages, W. J. Pollock, Pawhuska; Poncas, Pawnees, and Otoes, John Jensen, White Eagle; Iowas, Sacs and Foxs, and Pottawatomies, Lee Patrick, Sac and Fox; Cheyennes and Arapahoes, Maj. A. E. Woodson, Darlington; Kiowas, Comanches, and Apaches, Col. A. E. Randelet, Anadarko.

INDIANS.

The total number of Indians in Oklahoma is 12,041, a decrease of 993 since my last report. These Indians are all under the care of five agencies, except 298 Arizona Apaches who are held at Fort Sill as prisoners of war and under direct control of the War Department. Among these prisoners are a number of noted warriors, chief among whom is Geronimo, now peacefully engaged in agricultural pursuits on land allotted to these prisoners for cultivation near the fort.

The enumeration of the different tribes at the agencies is as follows:

CSAGE AGENCY.

Osages	1,765	Kaws	208

WHITE EAGLE AGENCY.

Poncas	567	Otoes	864
Pawnees	664	Tonkawas	56

SAC AND FOX AGENCY.

Sac and Fox	521	Pottawatomies	756
Iowas	89	Kickapoos	246
Shawnees	493		

DARLINGTON AGENCY.

Cheyennes	2,067	Arapahoes	1,110

KIOWA AGENCY.

Kiowas	1,126	Apaches	193
Comanches	1,553	Wichita and affiliated tribes	961

The Indians of the Territory are all making fairly good progress—are gradually learning and adopting the ways and habiliments of civilization. Of necessity this progress must be very slow, for the inbred habits and customs of centuries are not to be changed at bidding.

William De Lesdernier, of Colony, who has been in the Territory among the Indians for over thirty years, said in a recent conversation:

The settlement of the country has forced the Indian to advance. He comes in contact with the white men and almost without knowing it adopts their ways. Allotment of lands, citizenship, and the teaching of self-reliance will do wonders for the Indian. True, some of the Indians improve on the reservation, and often in spite of Indian agents who do more to make them savages than to civilize them, but as a general thing there is no real progress as long as the Indians are kept away from civilization and its ways, as they are on a reservation. Many of the Indians on allotments are beginning to realize that the Indian police, whom they have always considered the great arm of the law, no longer have any authority. They ask about the Territorial laws and their administration. Old Indians often come to me to inquire about "the white man's road." They want to know about the rights of a citizen, about the laws, and about the public schools. Many are asking about the public schools and talk of putting their children in them, saying that the Indian children will learn more with the white children.

From what I have seen of the Indians of the Territory, and from what I can obtain from the results obtained in the past by allotment, I believe that it would be better for the Indian and the Territory, both for the present and the future, to allot the lands of all the tribes in the Territory, to open the residue of the lands to settlement, and to as soon as practicable confer upon them the rights of citizenship.

OSAGES AND KAWS.

In response to a recent letter of inquiry as to the status and progress of the tribes under his jurisdiction William J. Pollock, United States Indian agent at Pawhuska, has the following to say:

The Osage Indian Reservation is located in the northeast corner of Oklahoma and contains about 1,400,000 acres of land, much of which is broken and rocky and fit for grazing purposes only. The valleys and lowlands are rich agricultural lands and produce large crops of wheat and corn. It is estimated that the Indians will produce this year on the reservation the following crops:

Wheat, 110,000 bushels; oats, 45,000 bushels; corn, 500,000 bushels; potatoes, 5,500 bushels, and a large quantity of other vegetables. The Osages own 7,521 head of horses, 698 mules, 20,280 head of cattle, and 20,221 domestic fowls. A large number of white men are farming on the reservation, on lands leased from the Indians, who will also produce large crops.

The Osages number, according to a census taken June 30, 1899, 1,765 persons. One-half of the Indians are full bloods, and the most of them still wear blankets and retain many of their ancient customs. But I am of the opinion that as the younger generation is now being educated a great change for the better will take place within a few years.

The other half of the tribe are mixed bloods and to all intents and purposes are white people, as all speak the English language, are educated to a certain extent, and live, dress, and act the same as their white neighbors.

Located on the reservation is a large boarding school, conducted by the Government, with an enrollment last year of 159 pupils. Besides this school there are two contract schools and many private schools. Nearly all Osage children of school age attended school last year.

The Osages are classed as the richest people in the world. They not only own 1,400,000 acres of land but have to their credit in the United States Treasury nearly $9,000,000. From the interest on this fund they are paid by the agent $200 per capita, per annum, in quarterly installments. In fact, they receive so much money that they do but little work and employ white people to do their farming and other work for them.

There are 25 leased pastures on the Osage Reservation from which the Indians derive an annual income of $40,000. Thousands of cattle are grazing in these pastures, which are the finest in the country.

There are three boarding schools throughout the agency, the Ponca, Pawnee, and Otoe, with the combined enrollment of 310 pupils. These schools all did excellent work, except at Ponca and Otoe, where we had the measles during the months of May and June. This worked a great hardship on these two schools, it being necessary to suspend work of all kinds and care for the sick. As the future of the Indian depends largely upon successful education, anything which interferes with the work of a school is greatly to be deplored.

CHEYENNES AND ARAPAHOES.

In his recent annual report to the honorable Commissioner of Indian Affairs Maj. A. E. Woodson, United States Indian agent at Darlington, in discussing the subject of citizenship for the Indians, says, among other things:

They are unprepared for citizenship and will continue to be until their tribal relations are dissolved by the strong arm of the Government. There are just as many so-called chiefs among them to-day as there ever were. As a rule, chiefs are opposed to progressive methods; they want to be let alone, and do not want to be coerced into the adoption of the "white man's ways." They maintain tribal customs that militate against all progress; their influence generally is bad for the advancement of their people. They encourage dancing and tribal visiting and the practice of medicine men, the plurality of wives, and marrying according to Indian custom.

Among allotted Indians there should be no chiefs. * * * Allotted Indians should be instructed that chiefs have no authority over them, and that each one is privileged to present his own ideas and assert his own opinions regardless of the chiefs. At this agency chiefs are ignored, but leaders among their people are recognized for their progressive habits and for the good influence they exercise over them in their respective farming districts, and such people are helpful to their people and the agent.

Experience teaches that making citizens of reservation Indians without other qualifications than being allotted lands in severalty is an exceedingly doubtful policy. More rapid progress and better results would, in my opinion, accrue if the Government still maintained its authority over them, and by compulsion require them to adopt civilized habits and labor for their own maintenance until they become self-supporting.

LAND CULTIVATED.

During the past year land was cultivated by the Indians of the Territory as follows:

	Acres.
Cheyenne and Arapahoe Agency	6,299
Kiowa and Comanche Agency	15,000
Osage Agency	15,960
Ponca, Pawnee, and Otoe Agency	4,650
Sac and Fox Agency	3,000

INDIAN RESERVATIONS.

There has been no material change in the status of the Indian reservations of the Territory the past year. The reservations still occupied exclusively by Indians in the Territory embrace the following area:

	Acres.
Kansas	100,137
Kiowa and Comanche	2,968,893
Osage	1,470,058
Otoe	129,113
Ponca	26,328
Wichita, etc	743,610
Total	5,438,139

The levying of county taxes upon property in reservations by the counties to which the reservations were attached for judicial purposes has caused considerable agitation during the year, and the legislative assembly at its recent session passed an act relieving the reservations of all tax except the Territorial and court taxes. There is still much agitation upon this subject in the Osage Reservation, where there is a strong sentiment in favor of having the reservation created a separate county.

No Indian reservations have been opened to settlement during the year, though it was hoped that the reservation occupied by the Wichita and affiliated tribes would be thrown open. This reservation was treated for in 1890, and in the spring of 1891, when the Cheyenne and Arapahoe Reservation was opened, so certain was the Secretary of the Interior that this reservation was to follow within the year that he designated it as County I, located the county seat, which was named Wilber, and a postmaster was appointed therefor. But the expected opening did not materialize, and owing to some legal technicalities the allotment of lands to the tribes on this reservation has never been completed. During the year the C. O. and G. Railway has built across the northern end of this reservation, and the Rock Island extension up the beautiful Washita Valley runs just on the southern border. With such excellent railway communication, rich soil, timbered hills and grass-laden valleys, fine streams, and beautiful scenery, this reservation would soon make one of the most populous and prosperous counties of the Territory, and I sincerely hope that the Department may see its way clear to carry out the treaty and open the land to settlement this coming year.

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During the year a controversy has arisen over the possession of certain school lands along the northern boundary of the Kiowa, Comanche, and Apache reservations. The proclamation of the President opening the Cheyenne and Arapahoe Reservation in 1891, in defining the southern boundary of the reservation, did not coincide with the boundaries given in the Indian treaties, and there has been a narrow strip of land in controversy since. Settlers have been living upon the land, and, although the Department has never recognized their rights, it has refrained from ejecting them. The Territory was granted sections 16 and 36 of each Congressional township of the land opened for settlement, and the school-land department has always been guided by the President's proclamation and leased the land accordingly. Some months ago, owing to unsettled titles in the vicinity, a town was built upon a school section at the terminus of the Rock Island extension west from Chickasha. This land is held under lease from the Territorial school-land board, who leased only land embraced within the boundaries defined in the President's proclamation, but the Indian Bureau claims that part of this school section is in the Kiowa and Comanche Reservation and seeks to dispossess the lessees.

Some action should be taken to amicably adjust these differences and establish permanently, by a correct survey, these disputed boundaries.

STATEHOOD.

It is the earnest wish of a large number of our intelligent and influential citizens that a State government be accorded to Oklahoma without further delay. The platforms of all political parties at their latest conventions have declared in favor of statehood upon such terms and with such boundaries as Congress may in its wisdom see fit to prescribe, and, tested by the standards that have heretofore prevailed in the admission of new States, Oklahoma is certainly entitled to all the rights and privileges of a State government. No fair-minded man can read the foregoing report of the opening, settlement, and development of this Territory without being convinced of the truth of this statement.

And yet there are many thoughtful people who have invested their capital and made their homes here who believe that it would be to the best interest of all, both now and for the years to come, to wait until such time as the Indian Territory, lying to the east and south of Oklahoma, can be united with us in one strong and wealthy commonwealth. We realize the fact that immediate statehood with our present boundaries would largely increase the expense of government, and that the additional burden must be borne by the taxpayers. At the present time only about one-fifth of the land entered and taken for homesteads has been patented and placed upon the lists of taxable property; and this constitutes less than one-fourth of the taxable valuation, showing that the burden of expense of the Territorial government is now borne by the railroads and by the property in the cities and towns. The present taxation averages from 4 to 5 per cent per annum upon an assessed valuation of about 60 per cent of the actual cash value. To create a State of Oklahoma with its present boundaries would necessarily more than double the expense of government without commensurate benefit, and I agree with the larger and more conservative part of our people that it is better to wait a reasonable time and eventually, by a union of the two Territories, establish one grand State which would be a pride and gratification to its people for generations.

Respectfully submitted.

C. M. BARNES, *Governor.*

The SECRETARY OF THE INTERIOR,
Washington, D. C.

WILBURTON COAL AND MINING COMPANY, WILBURTON, IND. T. STIRP PITS.

ANNUAL REPORT

OF THE

MINE INSPECTOR FOR THE INDIAN TERRITORY.

SOUTH MCALESTER, IND. T., *June 30, 1899.*

SIR: In compliance with the requirements of the act of Congress approved March 3, 1891, entitled "An act for the protection of the lives of miners in the Territories," I have the honor to submit to you my sixth annual report upon the condition of the coal mines in the Indian Territory for the year ended June 30, 1899.

Very respectfully, yours,

LUKE W. BRYAN,
Mine Inspector for the Indian Territory.

Hon. ETHAN ALLEN HITCHCOCK,
Secretary of the Interior, Washington, D. C.

The year past has been an active one in the coal indutsry. The changing circumstances resulting from the growth of the country, the constantly increasing influx of white citizens, with capital and without, is both the cause and effect of the legislation which steadily holds in view the ultimate improvement of the Indian Territory and its residents of all races and nationalities, as well as the Indians, by blood or marriage; and the native United States citizens, white and colored, have combined to bring to notice all the resources of the Territory, of which its coal mines have in the past and will continue to be, for some time in the future, a very considerable factor. The coal supply of the Indian Territory, so far as known, lies mainly in the Choctaw Nation, and its general formation and extent has been very fully described in my previous reports.

In conformity to the laws passed and the regulations prescribed by the Secretary of the Interior, a large number of applications have been made to the coal trustees of the Chactaw and Chickasaw nations, the Hon. N. B. Ainsworth, of McAlester, Ind. T., and the Hon. Lemuel C. Burris, of Tishomingo, Ind. T., for mineral leases under the act of Congress approved June 28, 1898, known as the Curtis Bill, and the Atoka or Dawes Agreement. Many of these are made by companies or individuals previously operating, but a very large number are by parties contemplating the development of new workings and are indicative of the growing importance of the mineral industry. Besides the applications for leases of coal lands many applications are made for leases for many other minerals, notably lead, zinc, and silver. That the last-named minerals may be found to some extent is beyond question, but whether they exist in such quantities as to warrant extensive working is a matter which practical tests and time alone can prove.

In my report for the current year the first thing noticed will be that the output is about the same as the year previous, notwithstanding the increase in the number of new operations. This will be accounted for by the fact that the miners of the organization known as the United Mine Workers of America, which includes in its membership a very large number of coal miners, have been on strike since March 1, 1899, and are still refraining from work. A complete history of this strike will be given in another part of this report. The effect has been to curtail the production of some companies and to deter, for the present, those contemplating sinking new shafts or slopes.

The number of accidents of all kinds is 53, which is 2 more than for the previous year; of these, 25 proved fatal. Falls of roof and explosions of fire damp are the principal causes, and these have been the result, in every instance, of neglect or disregard of rules by the miner, or of unavoidable accident. A careful study of my investigation in all cases of accidents will, I think, furnish proof of the salutary effect of the laws in force, which my inspection will, I am bound to say, show have been very generally and faithfully complied with and adhered to by the operators. In this connection it must be borne in mind that the Indian Territory coal is rich in volatile hydrocarbons of the olefine and paraffine series and gives off abundantly carburetted hydrogen (CH_4), besides the added danger, in the winter time, from coal dust, which can not at that season be eliminated, and which may, by one badly prepared blown-out shot, be converted into an element of destruction to the whole mine; and the few accidents from these causes bear testimony both to the character and intelligence of the miners, shot-firers, and other employees, as also to the care and caution maintained by the operators and their officials in charge.

Following is a list of coal companies and individuals operating within the Indian Territory during the year ended June 30, 1899:

Station.	Name of firm or individual.	Station.	Name of firm or individual.
On the Choctaw, Oklahoma and Gulf Railroad.		Kreb	T. J. Phillips & Co.
		McAlester	D. Edwards & Son.
		Do	Noah Samples.
South McAlester	Archibald & Busby.	Savanna (Fairview)	D. Edwards & Son.
Do	M. Parrola.	Do	Hailey & Co.
Alderson	Choctaw, Oklahoma and Gulf R. R. Co.	Kiowa	D. Edwards & Son.
		Midway	St. Louis-Galveston Coal and Mining Co.
Do	Kali-Inla Coal Co., lessees.	Lehigh	Atoka Coal and Mining Co.
Do	Mexican Gulf Coal and Transportation Co.	Coalgate	Southwestern Coal and Improvement Co.
Dow	Milby & Dow Coal Co.	Do	J. B. McDougall.
Do	M. J. Smith.	Do	Perry Brothers.
Haileyville	Hailey Coal and Mining Co.	*On the St. Louis and San Francisco Railway.*	
Hartshorne	Choctaw, Oklahoma and Gulf R. R. Co.		
Gowen	Do.		
Wilburton	McAlester Coal and Mineral Co.	Jenson	Kansas and Texas Coal Co.
		Poteau	Indianola Coal and Rwy. Co.
Do	Wilburton Coal and Mining Co.	Cavanal	Crescent Coal Co.
Do	Ola Coal and Mining Co.	Bryan	Kansas and Texas Coal Co.
Do	Eastern Coal and Mining Co.	Braidwood	Do.
		Antlers	J. H. Moulton.
Panola	Charles Hurst, of Springfield, Ill.	Do	H. C. Nash.
Babbit	Mexican Gulf Coal and Transportation Co.	*On the Kansas City, Pittsburg and Gulf Railway.*	
On the Missouri, Kansas and Texas Railway.			
		Panama	Ozark Coal and Rwy. Co.
Carbon	Kansas and Texas Coal Co.	Shady Point	Choctaw Coal Co.
Krebs	Osage Coal and Mining Co.	Heavener	Milby and Dow Coal Co.

ALDERSON MINE NO. 1.

ALDERSON MINE NO. 7.

ARCHIBALD MINE.

Archibald's slope mine, owned and operated by Thomas Archibald and William Busby, is situated on the crop of the McAlester coal, about 1½ miles north of the Choctaw, Oklahoma and Gulf Railroad from a point about 3 miles west of South McAlester. This mine consists of a slope that has been driven in some distance and quite an extensive strip pit. The coal dips in the main to the west, but on both the north and south sides of the mine dips to the north and to the south, this mine being located on a point where the crop turns from a westerly direction to an easterly direction. The coal at this point is 4 feet in thickness, and is of the same character as the McAlester coal. The dip on the north and south sides is quite steep, while toward the southwest the dip is very much lighter, being about 15° or 18°.

This mine is a new enterprise. The equipment, which will be complete, is not yet fully installed. The product is hauled by wagons at present to a switch on the Choctaw, Oklahoma and Gulf Railroad, as above stated, 3 miles west of South McAlester, the product being shipped over that line.

The output of this mine for the past year was 2,662 tons. There have been no accidents at this mine.

PARROLA STRIP PITS.

These strip pits have been operated but very little within the past year, the vein of coal being about 30 inches in thickness. There have been no shipments from these mines, the coal being hauled in wagons into the town of South McAlester and sold locally. No accidents to report.

ALDERSON MINE NO. 1.

This mine, as well as the other Alderson mines, was leased by the Kali-Inla Coal Company, who are operating under the Choctaw, Oklahoma and Gulf Railroad Company. The Kali-Inla Company commenced operations on October 1, 1898. During the period that this mine was still operated by the Choctaw, Oklahoma and Gulf Railroad Company there was one accident in the mine which was fatal, statement of which is given below.

The above mine is a slope mine, the slope being driven in 3,100 feet and has not been extended since my last report. There are 9 lifts in this mine, of which only 5 are in operation—the upper 4 lifts having been entirely worked out. The fifth entry has been connected with a new slope driven from the crop of coal about 3,500 feet distant, and this slope is described as a part of this No. 1 mine. The mine is equipped with a double hoisting engine with 10 by 16 cylinder, steam for which is furnished by a single tubular boiler of about 40 horsepower. The coal which was formerly brought in through the fifth east entry and hoisted from No. 1 slope is now taken in the opposite direction and hoisted out of the new slope above named. This new slope has been driven 1,500 feet, the intention being to drive the slope ahead, cutting off the long entries of No. 1 and enabling the product to be hoisted by this new slope. Ventilation of the new slope is had by the No. 1 fan, The ventilation in No. 1 is had by an 18-foot fan. A large compressor furnishes air for the mining machines which are in use in mine No. 1; also in mine No. 7; and this compressed air materially assists in the ventilation of all the mines named.

Mine No. 1 is a very dry and dusty mine and great care has to be taken to guard against the dangers arising from fire damp and windy or blown-out shots. The engines in use at No. 1 mine are first-motion double engines with 16 by 30 inch cylinder and 8-foot drum; steam is furnished by a battery of six boilers, which also furnish the steam for the fans, compressors, and other machinery. Owing to the extremely dry and dusty character of this mine, shot firers are employed and the mine is continually sprinkled in order to reduce the danger to a minimum. Robert Patterson is pit boss in No. 1 and the new slope. During the time the Kali-Inla Coal Company have operated this mine there have been two accidents, one of which proved fatal.

July 18, 1898 (while operated by Choctaw, Oklahoma and Gulf Railroad Company).—Cal Cooper (colored); miner; age, 37, single; killed by fall of slate. This man was loading a car of coal, when a piece of overhanging rock fell without warning, crushing him.

October 17, 1898.—W. C. Kelley (American); tracklayer; age, 51; married. Struck by pit car, having three ribs broken and body bruised; not seriously. This man was in the act of coming out of Entry 8 on the west side, intending to cross over the slope to Entry No. 8 on the east side, and to do so he had to pass through a curtain. As he was going through he heard a trip of cars coming and started to run back to the opening. In doing this his light went out and he could not see to get out of the way of the trip, and he was caught, being injured, as above stated. This man has been employed in these mines almost since their commencement, and has been shot firer, track layer, and air boss. He has never been injured before, as he is a very cautious and safe man.

December 28, 1898.—Robert Patterson (Scotch); miner; age, 27; married. Struck by pit car, killing him instantly. The injured man had finished his day's work and was on his way out of the mine; had passed over a knuckle at the head of an incline which is used to let the coal down from the fifth east entry to the sixth east entry, the loaded cars going down and the empty cars up, the coal being delivered at the head of this plane by mules. In this case the driver lost control of a trip coming in and it struck a car standing at the head of the plane, driving it over and causing it to run down the plane where about halfway down it struck this man. From the shape of the wound it is surmised that he was struck directly upon the head with such force as to result in instant death.

ALDERSON MINE NO. 7.

This mine has also been operated by the Kali-Inla Coal Company under lease from the Choctaw, Oklahoma and Gulf Railroad Company since October 1, 1898; prior to that time, that is to say, during the three months ending September 30, 1898, there were three accidents, two of which proved fatal. Further details of the mine will be found in the letters of Edwin Ludlow, superintendent, in connection with the Hartshorne mine.

A description of this mine is as follows: It is located about 4,000 feet west of mine No. 1. Very little extension has been made on the slope since my last report, but the entries have been extended for a considerable distance, there being nine lifts in this slope of about 300 feet each. Ventilation is had by an air shaft sunk near the slope, with a 12-foot fan. Mining in this mine is done mostly with machines, the Ingersoll machines, which are operated by compressed air. Some portion of the work, however, is done by hand labor. Air for these machines is brought from a large compressor at mine No. 1. It has been the custom to allow the machine men to fire their own shots, but on the importation of negroes, consequent upon the strike, it was decided, out of abundance of caution, that all firing should be done by regular shot firers at night when the others were out of the mine. The equipment of this mine is a pair of double hoisting engines with 24 by 36 inch cylinders, with a battery of two boilers of 70 horsepower each. Escapement and traveling ways are maintained in good order and the

conditions in these mines, as well as the other Alderson mines heretofore described, are reasonably good. William Bainbridge is pit boss. During the period that this mine was operated by the Kali-Inla Coal Company there were two accidents, both of which proved fatal, descriptions of which are given below.

The output of the Alderson mines Nos. 1 and 7 during the time they were operated by the Choctaw, Oklahoma and Gulf Railroad Company—that is to say, during the months of July, August, and September, 1898—was 39,489 tons, and for the rest of the current year, or during the time operated by the Kali-Inla Company, it was 93,780 tons.

The thickness of the coal in the Alderson mines has an average of 3 feet 6 inches, with an inclination or dip of about 15°. It is of excellent quality and similar in character to the well-known McAlester coal.

About 1 mile east of Alderson a small contract slope has been in operation, the coal being handled in connection with the coal from mine No. 7. The mine is equipped with a set of small double hoisting engines and ventilation is had by means of an air shaft. This mine has been driven down about two lifts, the output being hauled by team and loaded in the cars on the Choctaw, Oklahoma and Gulf Railroad track just east of Alderson station.

The Kali-Inla Coal Company has also made application for two leases about a mile northeast of Alderson, under the Choctaw, Oklahoma and Gulf Railroad Company. No development has as yet been made on these leases, but it is expected that a considerable quantity of coal will be produced therefrom within the near future.

A new shaft is being sunk about 1,200 feet south of the face of the workings of mine No. 7, described above, and will strike the face at a depth of about 600 feet. It is the intention of the Choctaw, Oklahoma and Gulf Railroad Company to drive a plane from the foot of this shaft northward and connect with No. 7 slope, the object being, when this connection is fully made, that the product of No. 7, as well as that of the deep shaft, will be taken to the foot of this deep shaft and be hoisted to the surface, at which point a switch will be built connecting with the Choctaw, Oklahoma and Gulf Railroad. This shaft is at present equipped with a small hoisting engine, used only for sinking purposes, and at this time is down to a depth of 250 feet, 10 by 20 feet in size, and is being well timbered with 2 by 10 inch plank and 8 by 8 timbers. This shaft will open a very large field of available good coal, the vein being a little less than 4 feet in thickness.

August 2, 1898.—Thomas Carl (American), miner; age, 19; single. Accident occurred in entry No. 7 west, room No. 8. Went into room with naked lamp burning on his head and lit the gas, burning him slightly.

August 20, 1898.—George Burkes (Russian), miner; age, 40; married. Killed in fourth entry west, room No. 6, by a fall of slate. He was mining off a shot when a piece of rock in what is known as a "pothole," above him, fell, crushing his skull and breaking his shoulder, killing him almost instantly.

August 23, 1898.—Antoine Arminite (Polander), miner; age, 45; married. Severely burned by powder in sixth west entry, room No. 15. This man, following a common custom among miners, was filling a cartridge with powder while his lamp was in his cap. A spark dropped from the lamp into the powder as it was being poured into the cartridge, igniting it and causing a severe burn, from the effects of which this man died on September 6, 1898. This practice of filling cartridges with powder, with lamp burning in cap at the same time, is a common occurrence, notwithstanding most positive rules prohibiting the practice. This man's death was due solely to his own carelessness.

April 7, 1899.—Velmer Youngblood (colored), miner; age, 25; single. Fall of coal, breaking sixth and seventh ribs. A slab of coal fell from the face while he was undermining, striking him in the side. He worked several hours after being injured, then went home and to bed, and died on the seventh day after being injured. The physician's certificate states that the cause of the death was traumatic pneumonia, resulting from a puncture of the left lung.

June 28, 1899.—Paul Olieaski (Polander), miner; age, 43; married. Going back on a shot. This man's injuries consisted of one broken arm, and face slightly cut and bruised. In this mine there are shot firers whose duty it is to fire all shots, and this after quitting time at night when no other persons are in the mine. This man, in direct violation of the rules, put in a shot and attempted to fire it at 1 o'clock p. m. The shot did not explode as soon as he expected, and, going back to ascertain the trouble, was met by the explosion and was injured as stated. This mine is one of the most dangerous in the Territory on account of its gas and inflammable dust, and the rules regarding the firing of shots are very rigorous and most strictly adhered to. In this case, had this shot proven windy and blown out while all the men were in the mine, it might have been a great disaster. It is to prevent just such disasters that shot firers are employed, so that in case of an explosion the loss of life will be reduced to a minimum and confined to the shot firers themselves. While this man was badly injured, still, were there any way to do so, he should be severely punished for so grossly violating so important a rule.

KALI-INLA COAL COMPANY,
Alderson, Ind. T., July 8, 1899.

DEAR SIR: The following is a statement of the output of the Alderson slopes, operated by the Kali-Inla Coal Company, during the six months ending June 30, 1899:

Month.	Tons shipped.	Tons used at mine.
January	17,596	662
February	6,040	250
March	2,694	260
April	4,977	421
May	8,096	450
June	10,225	460
Total	49,628	2,503

The decrease in output, beginning in February, was due to men going out on a strike, which began on the 9th.

The Alderson slopes, owned by the Choctaw, Oklahoma and Gulf Railroad Company, have been operated by the Kali-Inla Coal Company since October 1, 1898.

Since then the company has sunk a new slope, No. 15, which cuts off the second, third, fourth, fifth, and sixth east entries of old No. 1 slope, and laid a track from this opening past No. 1 slope to the tipple at No. 7 mine; the coal that was formerly hoisted out of No. 1 from these entries now going out of slope No 15, and thus shortening the distance hauled by mules. The new slope is laid part way down with 30-pound rails, and the coal is hoisted by a pair of 10 by 12 engines, geared at ratios of 1 to 4 to a 4-foot drum. The boiler that supplies the steam for this plant is an 80-horsepower tubular boiler.

The pitch of the slope is somewhat steeper than that of any of the others here, the pitch being about 15°, but from four to six cars of coal are hoisted each trip. The workings of the slope, being part of old No. 1, are ventilated by the large fan near the top of No. 1 slope, No. 15 being the downcast for one split of air, which, after going through No. 15 workings, is carried back to the old slope and then up to the fan. The other split of air goes down No. 1 slope through No. 1 workings, and then joins split from No. 15 at fifth east entry. The fan at this slope is an exhaust fan 18 feet in diameter, belt driven by a 16 by 36 engine.

The coal from both No. 1 and No. 15 slopes is hauled by a small 8-ton locomotive to the tipple at No. 7, where it is dumped and screened. This outside haul is about 1¼ miles long, and is laid with 30-pound steel rails. The grades are light, the heaviest not over 1½ per cent, and the locomotive can haul 40 loaded cars of coal. After the coal is placed under the tipple by the locomotive, it is hoisted to the top by the main-slope haulage rope.

No. 1 slope is now down 9 lifts, or about 3,100 feet, and the slope is not being driven at the present time. No. 7 slope is now down far enough to turn the ninth lift, or a little over 2,700 feet. The pitch of No. 7 is considerably less than No. 1 or No. 15, not being, on an average, over 8° or 9°.

None of these mines make much gas, but they are dry and the coal dust highly inflammable. At this time of the year the "sweat" of the roof, as it is called, causes considerable trouble, the roof continually chipping and falling.

About 1,000 feet ahead of No. 7 and about 300 feet west of the line of the slope a new shaft, 10 by 22 over the timbering, is being sunk, to which all the coal from the present No. 7 workings will be lowered. The shaft will be about 500 feet deep, and

is now down about 250 feet. It is being timbered with 8 by 8 pine and lugged with 2-inch thick pine planks. The shaft is divided into three compartments, two for hoisting and one for ladder way, steam and water pipes, etc. The equipment of this shaft, it is expected, will be very complete.

Yours, truly,

H. DENMAN,
Superintendent.

L. W. BRYAN, Esq.,
United States Mine Inspector, South McAlester, Ind. T.

KALI-INLA COAL COMPANY,
Alderson, Ind. T., July 24, 1899.

DEAR SIR: As by your request of July 21, we herewith inclose you a statement of our output for the three months ending December 31, 1898; also statement showing the average number of men employed for the above three months and the six months ending June 30, 1899. We would have embodied this in our previous letter in regard to output, but your letter stated that you already had these figures.

Yours truly,

H. DENMAN, *Superintendent.*

L. W. BRYAN, Esq.,
United States Mine Inspector, South McAlester, Ind. T.

Report of coal shipped by the Kali-Inla Coal Company from the Alderson slopes during the three months ending December 31, 1898.

Month.	Tons shipped.	Used at mines.	Average number men employed.
October	14,185	600	460
November	15,937	700	.....
December	14,030	500	.....
Total	44,152	1,800	460

The average number of men employed during the six months ending June 30, 1899, was 350, the average being greatly reduced on account of strike begun in February, 1899.

KALI-INLA COAL CO.,
By H. DENMAN, *Superintendent.*

AT DOW.

This is a point 4 miles east of Alderson, where the Milby & Dow Coal Company is operating a slope mine on Brushy Creek. This company is incorporated under the laws of the State of Texas. During the past year a shaft has been sunk and entries driven from the shaft to an intersection of the slope, the coal being brought from the slope to the foot of the shaft and the entire product of both openings dumped over the tipple at the shaft. This mine is equipped with a pair of Litchfield direct engines, 18 by 32 inch cylinders, with an 8-foot drum. The steam is furnished by two 60-horsepower boilers, the shaft being equipped with self-dumping cages, the tipple also having basket scales, so that the coal can be weighed separate after it has passed over the screen, or together as mine run, as they may elect. This tipple is especially well constructed and convenient for the rapid handling of coal. There is also a rotary screen attached to this plant for separating the pea coal from the slack. Ventilation is had in this mine by a 12-foot fan connected with an air course intersecting the main slope; good air courses and traveling ways are maintained. The coal at this

point is of about the same character as the Alderson coal, with a dip of about 6°. A. W. Breckenridge is pit boss at this mine. The output for the past year is 41,114 tons of coal. There have been two accidents at this mine during the current year, one of which proved fatal, a full description of same being given below. The following letters from Mr. Ludlow, consulting engineer of the company, are herewith inserted and made a part of this report. The rules in force in the mine are the same as those maintained by the Choctaw, Oklahoma and Gulf Railroad Company, of which copy will be inserted in this report in connection with the operations of the last-named company.

August 28, 1898.—John Brown (Scotch), miner, age 38, single, and George Wetzell (American), cager, age 28, single. Both burned by gas at same time, George Wetzell's injuries being slight, but Brown's severe, resulting in his death on September 4, 1898. This shaft is a new one, 234 feet in depth, recently sunk, and with headings turned on each side about 200 feet and connections made so there would be a good circulation of air. On Sunday evening at or near 7 o'clock four men went down this shaft for the purpose of loading some rock and to work off a shot that had been fired. John Brown, the man who was fatally burned, had gone up into the entry, where he had formerly been at work, not suspecting the presence or accumulation of any gas. Gas was present, however, and, being ignited by Brown, burned him about the face, neck, shoulders, and hands with such severity that he died on the seventh day after. The fire flashed back and slightly burned Wetzell, who had come near to get some tools.

MILBY & DOW COAL AND MINING COMPANY,
Hartshorne, Ind. T., July 21, 1899.

DEAR SIR: The tonnage from the Milby & Dow Coal and Mining Company for the six months ending June 30, 1899, amounted to 22,225.18 tons; for the first six months of the fiscal year it amounted to 18,889, making a total for the year ending June 30, 1899, of 41,114.18 tons.

Yours, truly,

EDWIN LUDLOW,
Consulting Engineer.

L. W. BRYAN,
Mine Inspector, South McAlester.

MILBY & DOW COAL AND MINING COMPANY,
Hartshorne, Ind. T., January 18, 1899.

DEAR SIR: The shipments from this company's mine at Dow, Ind. T., for the six months ending December 31, amounted to 16.889.09, to which should be added 2,000 tons for generating steam, making the total output 18,889.09. The work at this mine has been almost entirely of a developing nature, and every effort has been made to connect the shaft and the slope. On the 31st of December the two ends of the slopes were less than 50 feet apart, so that connection should be made before the 1st of February. The output after this connection is made should rapidly increase.

Yours, truly,

EDWIN LUDLOW,
Consulting Engineer.

L. W. BRYAN,
Mine Inspector, South McAlester.

Immediately adjoining the leases made to Milby & Dow, near Dow, on the south side of the Choctaw, Oklahoma and Gulf Railroad track, about 2 miles distant, some Kansas City people, represented at present by M. J. Smith, have made some leases and contemplate building 3 miles of railroad and open up quite extensive works. The coal at this point, as prospected, shows about 3 feet in thickness, with a very light dip, and of excellent quality and character. No mines have as yet been opened, the property just simply having been prospected.

WILBURTON, IND. T., *July 25, 1899.*

DEAR SIR: In regard to the information asked for concerning the Keystone Coal Company, who are about to build 3 miles of railroad south on Brushy Creek to their coal property for the purpose of mining coal, wish to say that the company consists of prominent coal and railroad people, and will at once proceed to open extensive mines as soon as the road can be built to the place.

Their coal is of the McAlester grade and the same as worked at Krebs, Alderson, and No. 9. Will say further that the coal on which they will sink and make openings is very nicely adapted to the economic working, as the pitch of the vein so far prospected shows a pitch of from 4 to 10 inches to the yard, which insures nice work as well as easy.

Yours, truly,

M. J. SMITH.

Mr. L. W. BRYAN,
United States Mine Inspector for Indian Territory,
South McAlester, Ind. T.

AT HAILEYVILLE.

Dr. D. M. Hailey owns a slope mine at this point, it having been operated during the year by Halstead & Carley under contract to put the coal on cars at a certain price. Within the past few weeks Mr. Halstead has retired and Mr. Carley and W. E. Hailey are continuing the operation of the mine under contract with the Hailey Mining Company on the same terms as it was being operated by Halstead & Carley. This slope is driven in three lifts, the coal running in thickness from 4 to 4½ feet, and being of the same character as the Hartshorne coal. This mine has been connected with a tipple at the railroad track by a trestlework starting at the mouth of the mine, and being about 22 feet above the railroad track at the tipple, the mine cars being hauled to the tipple by mules. This mine is equipped with a pair of double Ledgerwood hoisting engines of about 30 horsepower. Steam is furnished by a single boiler, but a second boiler is now being put in. Ventilation is had by an air shaft and furnace.

The output of this mine during the past six months, which is all the coal hoisted during the year, was 4,975 tons. There have been no accidents at this mine. Arrangements are now being made for sinking a new shaft, the intention being to connect with the face of the slope and the coal will then be hoisted by way of the shaft. This will give additional facilities for escapement and ventilation. A number of miners' houses have been erected, besides a store building, and three good houses for superintendents and store managers.

HAILEY COAL AND MINING COMPANY,
Haileyville, Ind. T., July 11, 1899.

DEAR SIR: Herein find inclosed list amount of screened coal mined from January 1, 1899, to and including June 30, 1899. Think Dr. Hailey contemplates developing mines more extensively in near future. Would be well to consult him; he will be pleased to give you the desired information.

Truly, yours,

HAILEY COAL AND MINING COMPANY,
By J. B. RILEY, *Cashier.*

Mr. L. W. BRYAN,
United States Mine Inspector, South McAlester, Ind. T.

Screened coal.

	Tons.
January, 1899	752.4
February, 1899	640
March, 1899	482.50
April, 1899	754.90
May, 1899	1,131.40
June, 1899	1,215.10

HAILEY COAL AND MINING COMPANY,
By J. B. RILEY, *Cashier.*

HARTSHORNE NO. 1 MINE.

This mine is now in the tenth year of its existence and the workings are very extensive. The shaft is 201 feet deep. The mine has a capacity of 1,000 tons per day, and has employed an average of 400 men during the past year.

The plane near the foot of the shaft is still used as an upcast for ventilation. The plane driven off the main south entry is used for lowering coal to the entry named. The haulage system, which was used between the foot of the shaft and the second plane driven off the main south entry, has been changed and put on the north side of the shaft, and the electric locomotive is now used for hauling coal from a plane driven off the main north entry about 1,800 feet through the main north entry to the foot of the shaft. The power to operate this electric locomotive and haulage is furnished by a 100-horsepower engine and a 100-horsepower dynamo, contained in a substantial engine house, equipped with all necessary appliances, as rheostat, ammeter, etc. The dynamo also furnishes power for two electric mining machines and an electric pump. The slope off the main north entry has been extended some distance and new lifts opened, and the plane off the same entry has been extended a considerable distance and the engines moved farther west, so as to lengthen that plane, and the coal is delivered to the electric locomotive at the foot of said plane where it connects with the main north entry.

This mine is equipped with first-motion double-hoisting engines, 16 by 32 inch cylinder and 8-foot drum. The plane driven off main south entry has a pair of geared double-hoisting engines, 16 by 32 inch cylinders, to lower coal to foot of shaft. A pair of first-motion 16 by 32 inch cylinders and 8-foot drum are set about 300 feet from top of shaft at a drill hole, through which a rope passes down slope for hauling coal to north entry, where it is dropped to foot of shaft. At a drill hole some 3,000 feet from main shaft are a pair of geared hoisting engines, which, by a rope passing down a drill hole, delivers the coal along the plane to the north entry, whence it is delivered to the foot of the shaft. There is an electric pump at foot of slope which forces water to foot of shaft, whence, together with the water that accumulates from the higher workings, it is thrown out by three steam pumps located at dump at foot of shaft. The slope near the shaft has been extended considerably during the past year. Two electric mining machines are in use at this mine.

Safety catches in this mine are of approved pattern. Cages are self-dumping and provided with overhead covers for protection of men.

The Guibal fan supplying this mine with the necessary air was destroyed by fire three years ago, but was promptly rebuilt and was in working order three days after the fire. It provides the mine with about 70,000 cubic feet of air per minute, which is abundant for the requirements of the law. The hoisting shaft and plane near foot of shaft are used as escapements, and traveling ways are well kept up.

A screening plant has been added to this shaft and has sufficient capacity to handle all the fine coal that this mine will produce and separate it into the different sizes of small coal.

The tipple has also been rebuilt during the past year and has been very much improved, being now equipped with basket scales as well as the large railway scales, thus permitting the weighing of the coal either as mine run or screened, as they may elect. This basket scale is equipped with a dial, which gives the weighman the weight instantly, as the hand

FRONT VIEW.

on the dial indicates the weight immediately and then goes back to "0." Proper metal speaking tube is provided. The thickness of the coal averages about 4 feet, but varies considerably in thickness at different points in the mine. The mine produces considerable fire damp. James Kern is mine boss.

This mine is now the most extensive in the Indian Territory, and the various difficulties which are always to be met with in such large mines are overcome as far as possible by the adoption of improved and modern appliances.

The output of this mine for the past year was 209,747 tons.

There have been 14 accidents at this mine during the past year, 2 of which were fatal.

August 19, 1898.—Charles Colson (American); miner; age 32; married. Burned by gas in entry No. 7, north. Colson, with his partner, was driving an entry and in the act of making a break through up to the air course which ran parallel with his entry. The place was generating some gas, and as a precaution he was working with his lamp setting on the floor. Suddenly the gas above his head became ignited—he thinks not by his lamp—burning him severely about the breast, face, and hands, as he was working without a shirt, which would have protected his body. This man died from his injuries on September 2, 1898.

October 11, 1898.—Angela Puconi (Italian); miner; age 24; single. Injured, in the main north entry, by fall of slate from roof striking his head and back.

October 22, 1898.—E. Warren (American); sprag ger; age 17; single. Injured in the main north entry. This man's duty was to sprag cars and to ride on the rear car of the trip, so that in case trips should break no cars would be left standing on the main line to be struck by other trips following. In this case he attempted to jump on the front end of a moving trip and missed his footing. He was injured internally by being squeezed, so that he died on the following day.

November 8, 1898.—J. I. Sample (American); rope-rider; age, 24; married. Small bone of right leg broken. The engineer failed to give him enough slack rope so that he could uncouple the hoisting rope from the trip, as it came over the knuckle, and the trip ran by, winding the wire rope about his leg with the result above stated.

January 3, 1899.—Steve Kondi (Italian); miner; age, 34; married. Left leg broken above and below knee. He had fired a shot ahead of time and had come to the bottom of the shaft to get out. He was warned by the cagers to get away from where he was standing, when a loaded car with an empty one ahead came in. The empty car jumped the track and caught him between the car and the timbers, injuring him as above described.

February 4, 1899.—Miller Daugherty (American); fire boss; age, 39; single. Back dislocated. This man's duty was to enter the mine and examine every working place before the miners entered the mine for their day's work. He would then investigate the ventilation and erect brattices wherever needed. In this case he was carrying some boards into the mine, loaded on a mine car, and was sitting on top of the boards as the car descended the slope. As the car turned to go into a cross-entry it passed through a curtain, and the curtain frame being lower than Daugherty thought, he was caught between it and the boards on which he was riding, causing a dislocation of the back.

March 7, 1899.—Robert Woods (American); miner; age, 70; married. Fall of slate. Was lying down mining when piece of slate fell, breaking small bone in right leg and bruising and spraining left leg.

March 11, 1899.—George Lucasavitch (Polander); miner; age, 33; married. Burned about face, neck, and hands. He improperly prepared a shot which blew out the tamping, flashed down and caught him, burning him slightly, though he had gone to a near breakthrough for safety.

March 15, 1899.—Hayes Matthews (colored); miner; age, 20; single. Toes of right foot mashed by fall of slate at face of coal. He was engaged in drilling at the face of room when, thinking he heard roof working, he stepped to one side of drill, where he was struck by piece of slate.

March 28, 1899.—Fred Mansen (colored); miner; age, 50; married. Powder burned on face and hands. He had prepared three shots and lit all three fuses. Two shots went off properly, but the third was overloaded and blew out, throwing fire down the entry where he was sitting, burning him as above described.

March 29, 1899.—John Miller (American); pole-holder on motor; age, 18; married. Compound fracture of left leg below knee. His duty was to ride the motor and hold the pole against the wire. In this case he had ridden out with the trip and as it slowed up he got off and spragged the first car, and in getting back on the motor

stepped between the bumpers of the motor and the head car, when they came together and caught his leg, injuring him as above stated.

May 10, 1899.—Oliver Orr (colored); miner; age, 37; married. Fall of slate. While mining off a shot a piece of slate falling dislocated his hip and sprained his back.

June 5, 1899.—Alex. Blight (American); timberman; age, 32; single. Slightly burned by gas. He was engaged in timbering up an entry (main north entry) where the roof had caved in to a height of 6 or 8 feet above the top of the coal, and in this pocket a small amount of gas had accumulated. His lamp was hanging below him on the timbers, and when he started down the gas from the slip followed him, igniting by the lamp and burning him as stated.

June 10, 1899.—Talley Sorrells (American); bellman; age, 25; married. Injured in slope No. 14, which is a slope driven off one of the main entries from shaft No. 1. He was throwing a latch on the parting when car became loosened from a trip that was going down and ran away, catching Sorrells and breaking both bones of his leg below the knee.

GOWEN MINE NO. 3.

Old Gowen mine No. 2, property of the Choctaw, Oklahoma and Gulf Railroad Company and located 3 miles north of Hartshorne, suspended all work during the previous year, and the railroad track from the main line of that company's road has been taken up and the town and post-office removed to a mine about 2 miles north of the main line of the Choctaw, Oklahoma and Gulf Railroad and about 4 miles distant from the town of Alderson. This mine is known as Gowen mine No. 3, and is located about 5 miles east of the old town of Gowen. There is a shaft at this mine 256 feet deep. A slope has been driven from the crop of the coal and will intersect the foot of the shaft at a distance of about 3,100 feet from the crop. It is now down about 2,000 feet, or about 6 lifts, and entries have been turned off on each side. Ventilation for this slope is at present had with a 15-foot fan and air shaft. This slope is equipped with a pair of double-hoisting engines and boilers. Coal is being hauled from the mouth of the slope over to the shaft by mules over a track built for that purpose, which track will be abandoned after the slope and shaft have been connected, and the coal will be dropped from the slope down to the foot of the shaft and hoisted therefrom. The dip of this coal is about 10° and the vein is from 4 to 5 feet thick and is of the same character as the Hartshorne coal.

This slope and shaft when connected will make the mine a very large producer, and is so situated in this particular coal field as to be very long lived. The coal at this point crops both to the north and to the east. Northwest of the shaft along the crop there is considerable coal that can be stripped, two large strip pits being in operation there at this time. From one of these strip pits a slope is being driven, and these will become good producers. The strip pits and the last-mentioned slope are connected with the main shaft by a narrow-gauge road over which the coal is deliverd to the tipple at the mouth of the shaft.

This shaft was sunk about nine years ago, but the coal at the foot of the shaft failed to show up well and the company, being at the time financially embarrassed, therefore abandoned the mine. Within the past two years the water has been pumped out and entries from the foot of the shaft driven far enough to get entirely through the faulted coal and into good workings, and the success of the shaft is now assured. Ventilation is had in this shaft by means of a 14-foot fan. Escapement will be had by means of a connection this mine will make with the slope which is being rapidly pushed to completion. The output of this mine for the past year is 66,740 tons. There have been four accidents, three of which proved fatal.

I also append hereto letters from Mr. Edwin Ludlow and a copy of the rules in force at all of the mines of the Choctaw, Oklahoma, and

Gulf Railroad Company. Mr. P. W. Malloy is mine boss at this mine. Particulars of accidents given below:

July 21, 1898.—A. Jenkins (American); miner; age, 16; single. Fall of slate. This accident, which resulted in a broken back to Jenkins, was the result of the failure on the part of a fellow workman, Thomas Fought, to obey instructions given him to remove the slate, which afterward fell with the result stated.

July 23, 1898.—William Myers (American); miner; age, 40; single. Fall of slate, breaking hip. This man was warned by foreman and others to prop this slate, as it was discovered to be loose, but he disregarded both instructions of foreman and warning from others and continued working until it fell, injuring him as described.

August 26, 1898.—J. C. Clendening (American); laborer; age, 35; married. Injured by runaway car in slope No. 5. He had gone down the slope to attend to the pump. A car loaded with coal had just been hoisted out of the slope and Charlie Martin, a colored man, uncoupled same before the switch was properly turned. The car, getting loose, ran back down the slope, knocking out the timbers and brattice work, and Clendening was struck by some of the timbers, breaking his ribs and injuring him so severely that he died the following night. This man lost his life solely because of the carelessness of a fellow employee.

November 21, 1898.—John Franklin (colored); miner; age, 23; single. Killed by going back on shot. Had lit two shots in his room and supposing both had exploded went back to ascertain the effect, when just as he entered the mouth of the place, the second shot went off and a piece of flying coal struck his head, crushing his skull.

HARTSHORNE, IND. T., *January 18, 1899.*

DEAR SIR: The total shipments from the mines of the Choctaw, Oklahoma and Gulf Company, for the six months ending December 31, 1898, amounted to 236,475.09 tons divided among the different mines as follows:

Alderson shipments	82,462.03	
Alderson, used for generating steam	3,000.00	
Total		85,462.03
Hartshorne, No. 1 shaft	119,775.19	
Hartshorne, used for generating steam	3,000.00	
Total		122,775.19
No. 3 shaft, Gowen	22,537.08	
No. 3, used for generating steam	1,800.00	
Total		24,337.08
Individual slopes and strip pits		3,899.19
Grand total		236,473.49

	Days worked.	Average per day.	Men employed.
		Tons.	
Alderson	110	777	342
Shaft No. 1	114	1,076	505
No. 3 shaft	111	200	128

Yours, truly,

EDWIN LUDLOW, *Superintendent Mines.*

L. W. BRYAN,
Mine Inspector, South McAlester.

HARTSHORNE, IND. T., *July 21, 1899.*

DEAR SIR: The tonnage from the mines of the Choctaw, Oklahoma and Gulf Company, for the six months ending June 30, 1899, was as follows:

Alderson	52,645.19
No. 1 shaft, Hartshorne	86,972.17
No. 3 shaft, Gowen	42,403.10
Strips	4,259.19
Total	186,282.07

With the exception of last year this is the heaviest tonnage we have ever had for the first six months of any year in the history of the company.

The strike prevailing in this region affected the tonnage in February and March, but May and June made up a good deal of the shortage, and during the month of June our output was 35,050 tons, the largest in the history of the company for that month, and as a matter of comparison it might be interesting to consider the tonnage for the month of June in previous years, viz, 1898, 23,477.14 tons; 1897, 16,507.9; 1896, 20,034.6; 1895, 17,855.10, and 1894, 31,638 tons. This last year there was also a strike in this region, accounting for the heavier tonnage then.

The principal development work during the year has been at No. 3 shaft, where we have opened up a fine vein which continues to prove good as we extend our entries, averaging nearly 5 feet in thickness. Work is being pushed day and night from both ends to connect the slope and the shaft. Total distance of this slope will be 3,101 feet, and on the 1st of July there were 1,040 feet remaining to be driven. With the completion of this slope we will be able to turn entries every 100 yards and very largely increase our output.

The company is also sinking a new shaft at Alderson that will strike the prolongation of the No. 7 slope at a distance of 3,400 feet from the surface. The shaft will be about 500 feet deep, and on July 1 was down 250 feet from the surface.

At No. 1 shaft Nos. 4 and 14 slopes are being extended and are opening up a fine field of flat coal that will extend the life of that mine for many years.

Yours, truly,

EDWIN LUDLOW, *Superintendent Mines.*

L. W. BRYAN,
Mine Inspector, South McAlester.

RULES GOVERNING THE MINES OF THE CHOCTAW, OKLAHOMA AND GULF RAILROAD COMPANY.

1. Miners or other workmen engaged in the mine shall read, and such as can not read shall have these rules read to them, and all persons engaged in the service of the company must be governed by these rules and regulations.
2. All miners must be in the mines before the 7 o'clock whistle blows in the morning. Drivers must have their mules out of the stables, and all other company men must be prepared to start work when the whistle blows at 7 o'clock.
3. Miners must be careful in building lumps of coal on their cars so as to prevent loss to both miner and company by coal falling off and causing wreck on slope.
4. That when any grievance may arise the party having the grievance must first try and adjust it with the pit boss; should they fail to adjust it they will refer it to the superintendent of the mines, whose decision shall be final.
5. Any employee feeling aggrieved in any respect must present his grievance to the pit boss in person and shall not stop work by reason of any grievance while the matter is being adjusted, and all matters shall be adjusted outside of working hours.
6. That any person found with tools or powder belonging to another, or taking or using tools or powder belonging to another without the owner's consent, shall, for the first offense, be fined $2.50 and for the second offense be discharged; such fines to be paid to the owner of the tools and be collected at the company's office. And any person detected in changing checks on the pit cars shall be immediately discharged.
7. All persons employed in the mines are strictly forbidden to ride up or down the slopes on the trips, and all men that may require to leave the mine while hoisting is being done must travel out the manways.
8. Miners are strictly forbidden from going into the next room for safety when firing a shot, but are required to go to a safe distance in the entry in order to be out of all danger.
9. All miners are strictly forbidden to fire a shot without giving warning of their intention to other workmen who may be near them and must wait until all are at a safe distance.
10. All miners must run their loaded cars down their rooms to the parting, but not out on the entry. The drivers shall pull the empty cars to the face of the pitch rooms—miners to make height for mules.
11. In all the mines, unless otherwise designated, the time for firing shots shall be at 12 o'clock noon when half time is being worked and 5 o'clock evening when mine is working three-quarters or full time. Any employee detected in breaking this rule shall have his turn stopped for the first offense and for the second offense shall be suspended one week, for the third offense will be discharged.
12. It shall be the duty of every miner to keep his room or working place well propped, in good order and repair, and keep it perfectly safe in every way: and any

miner who shall willfully and negligently or carelessly suffer his room to get out of order and repair shall, upon request, put same immediately in repair, and if he does not the company will do the work required and charge the cost of the same to the miner.

13. All miners causing falls of rock, either by carelessness or the reckless use of powder, blowing out the timbers or damaging brattice, will repair the same at their own expense, or failing to do so the company will repair and charge the cost of the same to the miner.

14. When falls of rock take place in working places that have been properly timbered, a reasonable amount (to be agreed upon between the pit boss and the miners) shall be paid for cleaning up the same; but where the falls occur through the blowing out of props or careless timbering, no allowance will be allowed for repairing.

15. In places where roofs are dangerous and sufficient timber can not be secured, it shall be the duty of the workman or the miner to notify the pit boss at once and stop work until the timber can be obtained. All timber and rails will be furnished by the company to each working place at the point of delivery of empty cars after the miner has ordered the same.

16. All drivers must take proper care of their mules, and any driver known to abuse, mistreat, or injure his mules in any way will be discharged.

17. The fire boss (in mines where gas or fire damp is generated) or person acting in that capacity shall examine every working place in the morning before any miner or employee has entered the same and shall mark the day of the month in some conspicuous place with chalk, which will be proof that he has examined the same, and under no circumstances must a miner or other employee enter a working place with an open lamp, after being notified not to do so, or after finding a warning notice at the entrance of his working place.

18. It will be the duty of the fire boss when he finds standing gas in any working place to carefully dead line the same by making one, two, or three crosses with chalk plainly on a piece of board, the number of crosses to signify the amount of gas in the working place. If the standing gas is in a room, he shall place the dead line at the entrance of the same; if in an entry or air course, at a safe distance from the gas. The fire boss shall then notify the pit boss, who will see that the gas is carefully removed, so as to avoid accident, and any employee who shall knowingly or carelessly enter a place with an open lamp thus dead lined shall be immediately discharged.

19. Miners employed in places where explosive gas is generated shall be furnished with a safety lamp, and if for any cause they leave their working places for even a short time, before reentering again with an open lamp they shall first try the place with a safety lamp to see that no gas has collected during their absence.

20. No miner who has left the employ of the company or who has been discharged from the same shall be entitled to any pay or money due him until he shall have put his room in perfect working order, as required by the company. All miners leaving said employment will be required to procure the certificate of the pit boss that they have complied with the rule aforesaid before final payment or settlement shall be made.

21. If any miner shall leave an empty pit car in his room over night and the car should be lost or destroyed by the caving in of the room or the firing of a shot or through any other carelessness, the full value of the pit car shall be charged to him.

22. Any miner or employee who shall intentionally damage any signal bell or wire, safety lamp, brattice, airway, or door, or open a door and not close it again, or do anything by which the safety of the men or the mine may be endangered, shall be promptly discharged.

23. In the event of death by accident in the mines employees shall be allowed one-half day for the funeral. In all other cases any employee desiring to attend the funeral of a fellow employee or a member of his family shall be at liberty to absent himself for that purpose after notifying the pit boss, but all other men shall be at work as usual.

24. No person shall be allowed to interfere with the employer's just right of employing, retaining, or discharging any person or persons whom the superintendent or mine boss having charge of the mine may consider proper, or to interfere, by threats or otherwise, with the right of any employee to work in any way or upon any terms and with whom he may think proper and best.

25. All powder will be delivered at the top of the shaft after being ordered by the miner, and will be sent down by the company. The rope rider will be instructed to deliver it at the proper entries, but in no case will the company be responsible for powder lost after it has been delivered at the entry marked on the powder keg.

26. Miners in making up charges or cartridges of powder must put their lamps on the outside of their box and not less than 5 feet therefrom. Any miner found making charges or cartridges of powder with his lamp burning on his head shall for the first offense be suspended for three days, and for the second offense shall be discharged.

27. All miners must carefully remove all slate from their coal while loading it into their cars. Any miner sending out slate in his coal cars shall for the first offense be docked 500 pounds, for the second offense 1,000 pounds, and for the third be suspended one week.

28. The whistle will blow at 7 o'clock in the evening when the colliery will not work on the following day.

29. All employees who desire to absent themselves from work must notify the foreman under whom they work the day before. Anyone absent without permission will for the first offense be suspended three days, and for the second offense be suspended one week, and for the third offense be discharged. All miners absenting themselves three consecutive days without permission will be considered as having left the employ of the company, and their places will be assigned to others.

30. All miners are strictly forbidden from leaving their working places to enter any vacant or unoccupied place without permission of the foreman. Any violation of this rule will be followed by an immediate discharge.

31. Anyone detected violating the above rules for which no penalty is named will for the first offense be suspended three days, for the second offense will be suspended for one week, and for the third offense will be discharged.

32. Any tenant of the company will be charged for any damage done to the house he occupies, and upon leaving the service, whether voluntary or by discharge, will not be entitled to receive any part of the wages due him until he shall have vacated the premises occupied by him and presented the keys of the same at the office, and the house has been examined and the amount of damages deducted from his wages.

33. No meeting shall be held during the working hours of a hoisting day.

Entering the employment of the company is understood to be an acceptance of the foregoing rules.

EDWIN LUDLOW,
Superintendent of Mines.

AT WILBURTON.

The McAlester Coal and Mineral Company's works are located close to the town of Wilburton. The coal is in two veins, separated by a stratum of 50 feet, the lower vein being 5 feet thick, with a dip of 18°; the upper vein has about the same dip and is about 4 feet 6 inches thick. In the lower vein a slope has been sunk 5 lifts, or about 1,600 feet; entries are turned therefrom, the upper entries having been worked out. In the upper vein the slope is down about 1,500 feet, or about 5 lifts, with entries turned off. Air courses are driven in both of these veins parallel with main entries. Ventilation is had in both of the veins by furnace air shafts. Hoisting is done from both these mines by a direct first-motion 14 by 20 single engine, Fulton Iron Works make, which is furnished with steam by a battery of two boilers. A switch with all the necessary conveniences is completed to a connection with the main line of the Choctaw, Oklahoma and Gulf Railroad. The output for the past year has been 48,062 tons. There has been one accident in this mine, and this was fatal.

This same company has opened up strip pits 1½ miles west of the above-mentioned mine from which they are producing coal, which is hauled by wagons from the said strip pits to the Choctaw, Oklahoma and Gulf Railroad. This company has erected a large number of miners' houses and a store, and are preparing to make their operation a large one.

July 13, 1899.—Victor Debray (French); miner; age, 30; married. Crushed by premature blast. This man was working on a night-shift with his partner, and his last work in the morning, before leaving the mine, consisted of firing his shots so that the day man would have work. In this case he fired three or four shots, which he had prepared, and the fourth shot, owing either to a defective squib or because of being bitten off too short by the miner, went off at once upon the application of the miner's lamp, giving him no chance to escape and resulting in his instant death.

EASTERN COAL AND MINING COMPANY.

A short distance east of the McAlester Coal and Mineral Company's plant a switch connects with the main line of the Choctaw, Oklahoma

WILBURTON COAL AND MINING COMPANY. MINES 1 AND 2.

and Gulf Railroad, which switch is built in a westerly direction a distance of 2 miles to a point where the Eastern Coal and Mining Company, under the supervision of James McConnell, is sinking a shaft, which shaft is now down about 40 feet; the intention being to connect this shaft with a slope which has already been driven from the crop of the coal down two lifts. This slope will be continued to connect with an entry running west from the foot of the shaft and the entire product of both slope and shaft will then be hoisted through the shaft and dumped over the tipple at the shaft. Two double-hoisting engines and two boilers are now on the ground and being set up as equipment for this shaft. The shaft will also be equipped with basket scales, railway scales, and self-dumping cages, and an 18-foot fan. The slope above mentioned is at present equipped with a 20-horsepower boiler with an 8 by 10 single-hoisting engine. Considerable coal had been taken out of the slope above mentioned and hauled on wagons to the main line of the Choctaw, Oklahoma and Gulf Railroad before this switch was completed. Just beyond the end of this track the Eastern Coal and Mining Company has also opened some strip pits out of which some coal has been mined and shipped.

The total output from this company's mine for the year being 1,008 tons. There have been no accidents to report.

WILBURTON COAL AND MINING COMPANY.

The plant of this company is located on the Choctaw, Oklahoma and Gulf Railroad, 1 mile east of Wilburton. The coal at this point is in two veins, separated by about 50 feet of strata, the upper being about 4½ feet thick, with a dip of about 25°, and the lower vein about 5 feet thick, with a dip same as the upper one. At about a mile east of Wilburton two slopes have been sunk, the one directly over the other. The slope in the upper vein has been sunk about 600 feet and the lower one about 700 feet, far enough for two lifts. Air courses are driven in each vein parallel with the slope, one air course on each side, proper breakthroughs and connections being made. Escapements are driven for each slope, the mouths of which are not less than 200 feet from the mouth of the slope. Ventilation is had by the use of two 10-foot fans in ventilating shafts, one for each opening as above. A track is built from the main line of the Choctaw, Oklahoma and Gulf Railroad, 3,200 feet in length, with necessary storage tracks to accommodate the output. Railroad scales have also been put in.

The coal from Nos. 1 and 2 is hoisted by a 40-horsepower single engine, friction drum, and then dropped to the tipple which has been arranged to accommodate both mines. About 30 houses have been erected, a storehouse, and other necessary buildings. This company has also opened up what they call their No. 3 mine. A slope had been driven down about 300 feet on the lower vein, about three-fourths of a mile west of their Nos. 1 and 2 slopes, near the railroad depot at Wilburton, air shaft sunk, and stack built for ventilation purposes. The coal at this point, however, was found to be at fault, and this slope was abandoned and a new one sunk in the upper vein directly over the lower opening, and the same equipment, which consisted of a pair of double Ledgerwood engines, 8 by 10, with one boiler, being used for the new opening. The coal in the upper vein at this point shows to be about 4 feet thick and of excellent character. A track has been built to the railroad to connect this mine with the main line. This mine is driven far enough for two lifts, but being new, however, it has not yet

worked up to a good production. An escapement is now being driven and will be completed in a very short time.

The above-named company has also opened two other mines, their Nos. 4 and 5, neither of which have as yet been opened up to any extent, but the work on both of them is being rapidly pushed, No. 4 being equipped with a pair of double Ledgerwood engines 8 by 10, and No. 5 being equipped with a single hoisting engine. The output of this company for the past year has been 48,561 tons. Two accidents have occurred, both of which proved fatal. I append letters from Superintendent M. J. Smith, showing the condition of the property of this company, with its output. Details of accidents are given below:

September 23, 1898.—R. A. Walker (American), miner; age, 35; single. Burned by gas. This man was working a room and driving a break through from his room to an adjoining room for the purpose of passing the air through; he expected the presence of gas until he had broken through, and he, therefore, placed his lamp on the floor and outside the place where he suspected the presence of gas; but in brushing the gas out he brushed it to his lamp, when it ignited, burning him about the face, neck, breast, and hands. He did not seem to be so seriously injured, but on the seventh day after the accident he died as a result of the burns.

November 17, 1898.—George Tilton (American), laborer; age, 36; widower. Burned by powder. He had drilled a hole through the coal and fired a small stick of dynamite to spring the bottom of the hole; he then started to pour powder into the hole when it was ignited by a piece of burning fuse from the first shot, and he was burned so severely that he died on the 25th of the same month.

WILBURTON COAL AND MINING COMPANY,
Wilburton, Ind. T., January 6, 1899.

DEAR SIR: I beg to submit to you the following report of output for the six months ending December 31, 1898, of the Wilburton Coal and Mining Company:

Month.	Tons.	Men employed.	Days worked.
July	3,253	85	20
August	3,241	76	22
September	2,809	64	21
October	4,257	94	23
November	6,015	106	26
December	6,188	115	21
Total	25,763	520	133

Average men employed, 86⅔ per month; days worked, 22⅓.

Beg to state that this company is making improvements as fast as possible in all their mines, and the point in view is to concentrate all their slopes now sinking (four in number) at one shaft bottom, said shaft to be sunk when the present slopes are deep enough to land the coal at the fifth lift, and when completed there will be forty distinct entries above the shaft level and both veins connected at shaft bottom by means of a tunnel from one to the other.

The railroad track has been completed to No. 3 mine and the pit top finished. This mine is on the upper vein and very good roof. Coal is a little over 3 feet in thickness, good quality, and clean. The slope is now down 300 feet, and the first east and west entries turned. The fans are now being put up at the slopes 1 and 2. Slope 4 has also reached the first lift of east and west entries and is in good condition.

Yours, truly,

M. J. SMITH, *Superintendent.*

Mr. L. W. BRYAN,
United States Mine Inspector for Indian Territory.

WILBURTON COAL AND MINING COMPANY,
Wilburton, Ind. T., July 5, 1899.

DEAR SIR: As per your letter, we beg to report that during the six months ending June 30, 1899, we have mined and shipped from our mines at Wilburton 22,798 tons of coal. Also beg to report that during the six months ending June 30, 1899, we

OLA COAL AND MINING COMPANY, OLA, IND. T.

have opened a new slope known as our No. 5 on the top vein of coal, same being 4 feet 10 inches in thickness and free from impurities, with good roof and bottom, which warrants the mining of the coal clean.

Have also in the last three months added to our equipment three steam fans, dimensions 3 by 10 feet, the same giving good service and greatly improving the ventilation.

Yours, truly,

M. J. SMITH, *Superintendent.*

Mr. L. W. BRYAN,
United States Mine Inspector, South McAlester, Ind. T.

OLA.

A station and post-office located about 3 miles east of Wilburton is known as Ola. There are two veins of coal at this point separated by about 50 feet of strata. The upper vein is about 4 feet 6 inches thick, with a dip of about 25°; the lower vein, being of about the same dip and 5 feet thick, is about 900 feet south of the Choctaw, Oklahoma, and Gulf Railroad track. Their slope, No. 1, has been sunk in the lower vein about 700 feet; three lifts have been turned off. The coal in some of these entries shows up to quite 6 feet in thickness. Air courses have been driven on each side of the slope and also on each side of the entries with proper breakthroughs. Ventilation is had by a 12-foot fan driven by an 8 by 12 Erie City engine, which is located at the mouth of the air shaft immediately over the east air course parallel with the slope. Proper escapement is had. This mine is equipped with a 50-horsepower single engine, geared, and a 6-foot drum, and is furnished with steam by two boilers.

Slope mine No. 2 has been opened up, being on the same vein as No. 1, and about 1,400 feet east of mine No. 1. This slope is down two lifts and is connected with slope No. 1. It is equipped with Ledgerwood hoisting engine and boiler built on the same base. Their mine No. 3 is driven in the upper vein of coal near to mine No. 1, which, as above stated, is the lower vein. This mine is also driven two lifts and is equipped with a double hoisting engine run by steam from No. 1 mine, and the coal being dumped over No. 1 tipple, at which point they have a pair of railroad scales where the weighing is done.

This company's mine No. 4 or Klondike, as it is called, is located about 1 mile east of No. 1, and up to the present time has been operated by mule power, no machinery having yet been furnished. This mine has been opened sufficiently to show the coal to be of good thickness, being about 6 feet, and of excellent character. The output of these mines for the past year has been 36,880 tons. There have been four accidents, two of which were fatal, particulars of which are hereto appended:

October 30, 1898.—T. F. Neal (American), miner; age, 40; married. Falling rock caused broken leg. This man was loading coal out of a room at the face, when a piece of rock fell from between the timbers, striking and breaking his leg.

April 22, 1899.—Ernest Picckivini, Francesco Marville, and Angelo De Geromeco (Italian), miners; aged, respectively, 25, 45, and 35, the first single, the last two married. Burned by gas. These three men were engaged in driving the third east entry, in which entry there was a small horseback, making a V-shaped cavity in the roof. It appears from the investigation that these three men entered the mine before the regular time for going to work, i. e., 7 o'clock a. m., and after the fire boss had gone his rounds, visiting each and every working place in the mine. The fire boss had discovered on his rounds that morning that this place was making gas and had marked and dead-lined it. It also appears that these men entered the mine about 6 o'clock, and in order to get into their working places they deliberately walked over the dead line, which was so plainly marked they could not avoid seeing it, igniting the gas and burning themselves so severely that Ernest Picckivini died

the same day, and Angelo De Geromeco died the following Monday morning at St. John's Hospital at South McAlester. These men, in going into the mine at the hour they did, and in deliberately passing over the dead line, violated one of the most rigid rules of this as well as of all other mining companies in the Territory, and had they even been fortunate enough to have escaped igniting the accumulated gas, would have been most severely reprimanded and suspended from work for a time for violating said rules.

OLA, IND. T., *July 9, 1899.*

DEAR SIR: We beg to report the total output of the Ola Coal and Mining Company for the last six months at 12,880 tons. The development of Mine No. 1 for that time has been practically stopped, owing to water in the mine, and after repeated trials with pumps we have at last found one that will do the work and keep the water out, so that we soon expect to have our slope down for the fourth lift.

The slope on the top vein, started several months ago, is now being driven and the entries will soon be turned. The coal in this vein is very regular and has a fine roof and is getting much harder as the slope goes down. The coal in this vein is about 4½ feet.

We contemplate starting another slope east of No. 3, and adding another steam boiler and a larger engine for our top vein, thus increasing our equipment.

Yours, truly,

O. E. WOODS.

Hon. L. W. BRYAN,
United States Mine Inspector.

PONOLA.

At Ponola, about 5 miles east of Wilburton, a slope is being driven by Charles Hurst. This slope, at present writing, is driven in about 50 or 60 feet, and seems to be in the nature of a test slope. The vein at present shows up about 3 feet of good coal. No machinery has as yet been introduced, the operation being started within the last few weeks.

WILBURTON, IND. T., *July 25, 1899.*

DEAR SIR: The slope now being put in at Ponola, on the Choctaw, Oklahoma and Gulf Railroad, is owned and controlled by Charles Hurst, of Springfield, Ill., who is also connected with the West End Coal Company of that place.

The Ponola coal is of a very good quality and the pitch about 9 degrees, which will make very nice work. The slope is down about 50 feet, the coal very hard, and if it continues to improve as it has so far, it will result in a nice 4-foot vein of McAlester coal that, together with the convenient location of same, will make it one of the best plants on the line of the Choctaw road.

Yours, truly,

M. J. SMITH.

Mr. L. W. BRYAN,
United States Mine Inspector for Indian Territory.

BABBITT.

At Babbitt, 1 mile southwest of Howe Station, on the Choctaw, Oklahoma and Gulf Railroad, the Mexican Gulf Coal and Transportation Company has been sinking a shaft. The following letter from Mr. J. H. Needham, superintendent, will give the size and character of this plant and their operations and output. There have been no accidents to report at this mine.

This mine is located 1 mile south of the main line of the Choctaw Oklahoma and Gulf Railroad at Babbitt, from which point a track has been built out three-fourths of a mile. This company has started a slope in the crop of the coal and has driven it about 800 feet; they have also sunk a single shaft 100 feet in depth ahead of this slope and have connected the two. They have taken out of this shaft 6,253 tons of coal, and have hauled it in mine cars over a narrow-gauge track to a

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tipple which is erected on the spur built out from the main line of the railroad, at which place they have a small hoisting engine for the purpose of hoisting these cars up onto the tipple. At this point they intend to sink a shaft which will be about 450 feet in depth, which they will connect with their present shaft and slope and bring all of their coal to the foot of the deep shaft and from there hoist it to the tipple. Their small shaft is equipped with a pair of double-hoisting engines, with 12 by 14 inch cylinders, and is ventilated with a 14-foot fan. Escapement from the present shaft is had by its connection with the slope. At this point the coal is 4 feet thick and of excellent character. This coal is very soft and friable, making at least 50 per cent slack, which adapts it especially for coking.

MEXICAN GULF COAL AND TRANSPORTATION CO.,
Howe, Ind. T., July 10, 1899.

DEAR SIR: In compliance with your request of June 28, I herewith submit to you the statistics for the six months ending June 30, 1899, showing the operations of the mines operated by this company during the last six months.

We commenced turning entries from the bottom of the shaft February 15, and our total output is 6,253 tons. Our present shaft is 110 feet from surface, and is equipped with fourth-motion, double-hoisting engine, 12 by 14 inch cylinder, with 6-foot drum, and the mine is ventilated by a 12-foot McMurray & Crimmer fan, Brazil, Ind.

The officials of this company are named above. We have encountered many difficulties, owing to the strike, and have not been able to run successfully, but have had about an average of 28 miners daily since the strike commenced. Our coal is more of a bituminous nature than any other in the Territory, and is known as the Mitchell Basin coal.

In addition to the present shaft, we are sinking a large shaft 10 by 22, and also have 100 ovens in course of erection, which will be complete and ready for operation September 1, and will continue the erection of ovens as fast as the output from the new shaft will permit. The new shaft will be known as No. 2 and the present one as No. 1. We have been fortunate enough since we commenced operations in not having any accident in the mine so far.

We have the same rules at our mines that govern the other mines of the Territory for the safety of the miners, and they are rigidly enforced at all times.

Any further information you should require in regard to our company and the workings of the mines will be glad at all times to furnish same.

Respectfully,

J. H. NEEDHAM, *Superintendent.*

Mr. L. W. BRYAN,
Mine Inspector, South McAlester, Ind. T.

MANUFACTURE OF COKE ON THE CHOCTAW, OKLAHOMA AND GULF RAILROAD.

At Alderson, on the Choctaw, Oklahoma and Gulf Railroad, the Mexican Gulf Coal and Transportation Company has had in operation for several years a large coke plant. Fifty ovens and a large washer for separating the impurities from the coal before manufacturing the coke are in operation at this point. This product is mostly shipped to Mexico, and the product for the past year was 13,226 tons.

At Babbitt, 1 mile southwest of Howe station, the above-named company is now erecting 100 coke ovens. It is their intention to put in a washer with a capacity sufficient to work 200 ovens and other appliances necessary for the manufacture of coke in large quantities. No output for the past year, the ovens being still in process of erection.

Below will be found a résumé of the shipments of coal and coke for the past year from the mines and plants located on the Choctaw, Oklahoma and Gulf Railroad in the Indian Territory.

Total output of coal and number of men employed in mines adjacent to the Choctaw, Oklahoma and Gulf Railroad, in the Indian Territory, for the year ended June 30, 1899.

Station.	Operator.	Men employed.	Tons shipped.
South McAlester	Archibald & Busby; M. Parrolla	35	2,662
Alderson	Choctaw, Oklahoma and Gulf R. R. Co.	342	39,489
	Kali-Inla Coal Co.		93,780
Dow	Milby & Dow Coal Co.; M. J. Smith	102	41,114
Haileyville	Hailey Coal and Mining Co.	24	4,975
Hartshorne	Choctaw, Oklahoma and Gulf R. R. Co.	505	209,747
Gowen	do.	128	66,740
Wilburton	McAlester Coal and Mineral Co.	132	48,062
	Eastern Coal and Mining Co.	20	1,008
	Wilburton Coal and Mining Co.	126	48,561
	Ola Coal and Mining Co.	85	36,880
Howe	Mexican Gulf Coal and Transportation Co.	60	6,253
Total		1,559	599,271

Total output of coke on Choctaw, Oklahoma and Gulf Railroad, in the Indian Territory, for the year ended June 30, 1899.

	Tons.
Alderson, Mexican Gulf Coal and Transportation Company	13,226

A description of the various mines situated on or adjacent to the Missouri, Kansas and Texas Railway, in the Indian Territory, is as follows:

CARBON MINE, NO. 50.

[Kansas and Texas Coal Company.]

This mine is located at the town of Carbon, formerly Cherryvale and Simpson, at the terminus of the McAlester Branch of the Missouri, Kansas and Texas Railway, about 7 miles distant from the town of McAlester. The coal in this mine is of the same character as the McAlester coal and the vein is about 3 feet 6 inches in thickness. The mine is driven down to make six lifts and was equipped with a very fine tipple and shaker screen. A fire occurred there on the 14th day of July, 1898, which destroyed the tipple and machinery. A connection was then made with mine No. 52, which adjoins mine No. 51, and coal from this mine was hauled underground and hoisted from mine No. 52 to the tipple. Since that time, however, a new tipple has been erected, equipped with a double-geared hoisting engine of about 80 horsepower, which is supplied with steam from a battery of four boilers of 160 horse power, and the coal is now being dumped over the new tipple. Ventilation is had by means of two 10-foot fans, an abundance of air is furnished, and all the requirements of law are fully complied with. Escapement is had by means of the aforementioned connection with mine No. 52.

There have been two accidents at this mine during the past year, one which proved fatal. Particulars of these accidents are appended below:

December 13, 1898.—Peter Malanari (Italian); shot firer; age, 26; single. Went back on a shot. This man, as shot firer, had lighted a shot, or possibly several, and the supposition is that, believing a certain shot had exploded, he went back to see the effect of the shot, when it suddenly went off in his face, fracturing his skull and injuring him so severely that he died on the sixth day after. This death was the result of mistaken judgment on the part of the injured man.

October 10, 1898.—Horace Brown (colored); miner; age, 38; single. Burned by gas. This man was driving an air course from the third east to the second east entry through room No. 15, where the accident occurred. He had brattices built up close to the face, but he failed to brush out all the gas and did not use his safety lamp. He was slightly burned by an ignition of the gas, but was at work again within three weeks.

CARBON, MINE NO. 52.

This mine is located about 2,000 feet west of mine No. 50. This slope is driven in 1,500 feet, with six lifts, and is connected with mine No. 50, which furnishes the necessary escapement. Ventilation is had by means of a 12-foot fan, located at the end of the air course near the mouth of the mine. In this mine are three Harrison mining machines, which are supplied with air by a Norwalk compressor. First motion double hoisting engines of about 90 horsepower are in use. Steam is supplied the compressor, hoisting engines, and pumps by a battery of four boilers.

The coal in this mine is of the same character and thickness as that in mine No. 50. Traveling ways and air courses are properly maintained.

There have been two accidents at this mine during the past year, neither of which proved fatal, full particulars of which are given below:

August 11, 1898.—D. J. Williams (Welsh), miner; age, 18; single. Fall of slate, causing broken leg. This man was in the act of setting a timber to hold up a piece of slate when same fell on him, injuring him as above stated.

November 4, 1898.—L. P. McDougall (American), miner; age, 25; married. Burned by powder. This man had filled two cartridges with lamp in his cap at the time, and after filling the cartridges started to walk before closing the tops of the cartridges (intending to close them as he went along), when he struck his lamp against the roof, knocking a spark into one of the cartridges, exploding it, and burning himself so severely that he was laid up for several weeks. This accident was entirely due to the injured man's own carelessness and no one else was to blame.

MINE NO. 2.

This mine was leased by the Kansas and Texas Coal Company from the McAlester Coal and Coke Company, and is a slope mine about 2 miles south of Carbon. The equipment of this mine consists of an 18 by 24 single-hoisting engine with two boilers, with a combined power of 100 horsepower. This engine has two independent friction drums, one of the drums being used to pull coal out of the mine and the other being used to pull mine cars over the hill to the tipple, the tipple and railroad track being 1,300 feet distant from the slope. This slope is driven in about 1,500 feet or five lifts. The first, second, and third lifts are practically worked out. The fifth lift has been turned into a long-wall working and is now being worked on the long-wall plan. The coal in this mine runs from 4 to 5 feet in thickness with a dip of about 10 degrees. The mine is ventilated by two 12-foot fans, one being located on the air course on the east side of the slope and the other being located on the air course on the west side of the slope; the ventilation of this mine is excellent. The Kansas and Texas Coal Company's lease on this mine expired June 13, 1899, since which time it has been in the hands of the McAlester Coal and Coke Company, and the latter company is now preparing to operate it. It is their purpose to do away with the haul over the hill from the slope to the present tipple by building a branch from the track running to Carbon about a half mile in length, which will throw the track and tipple directly at the mouth of the mine.

Some 3,000 feet distant from this mine is the shaft of the old No. 12 mine, which had been operated by the Osage Coal and Mining Company several years ago and abandoned. Some consideration has been given to the advisability of opening up this old No. 12 shaft and connecting the same with this mine. There are a number of houses at this mine No. 2, necessary store buildings, and other improvements. There have been no accidents at this mine during the past year.

The Kansas and Texas Coal Company, in connection with their mines, have erected an ice plant and cold storage, which are operated for the benefit of their employees and add greatly to their comfort. Besides this, they have erected at this mining camp at least 100 houses, together with storehouses and other necessary buildings, which makes this a very complete mining camp.

The total output of the Kansas and Texas Coal Company from Carbon and from mine No. 2 for the past year is 140,235 tons. Statements and letters from the general office at St. Louis are hereto appended. I also append a complete copy of the rules enforced by this company.

MINE NO. 67.

This is a new slope mine, opened east of No. 50, and about 4,600 feet distant. This slope has been driven in some little distance, but no entries have yet been turned. Machinery is now being put on the ground for the operation of this mine and the tracks of the railroad being extended to accommodate it. The necessary tipple, fans, air courses, and travel ways will be added as the work progresses.

Directly east of this the company has opened a strip pit, out of which but little coal has yet been taken.

At a point about 3 miles west of mine No. 67 James Degnan and James McConnell have started to open up a slope mine, on which they have done some work, the intention being to have the railroad track extend to this mine. It is on the same vein of coal and will be of the same character as that produced by the Kansas and Texas Coal Company at Carbon. At the present writing nothing is being done, but the parties in interest say that it is the intention to proceed vigorously in the near future.

Information for United States mine inspector for Indian Territory, covering operations of Kansas and Texas Coal Company for six months ending December 31, 1898.

Month.	Mine No. 2.			Mine No. 52.		
	Days in operation.	Number of men.	Tonnage.	Days in operation.	Number of men.	Tonnage.
July	11.8	100	3,592	22.3	170	7,100
August	17.5	113	4,702	26.7	203	7,890
September	17.0	131	4,098	21.8	271	8,014
October	16.6	151	4,283	24.7	303	9,650
November	16.2	197	4,318	23.3	269	10,667
December	22.0	134	5,312	21.0	299	10,457
Total	101.1	{ 826 a 138 }	26,305	139.8	{ 1,515 a 252 }	53,778

a Average.

W. P. HEATH, *Secretary.*

ST. LOUIS, MO., *January 18, 1899.*

KANSAS AND TEXAS COAL COMPANY,
St. Louis, Mo., July 7, 1899.

DEAR SIR: Complying with your request of June 29, please find below the production of coal by this company in the Indian Territory for the six months ending June 30, 1899:

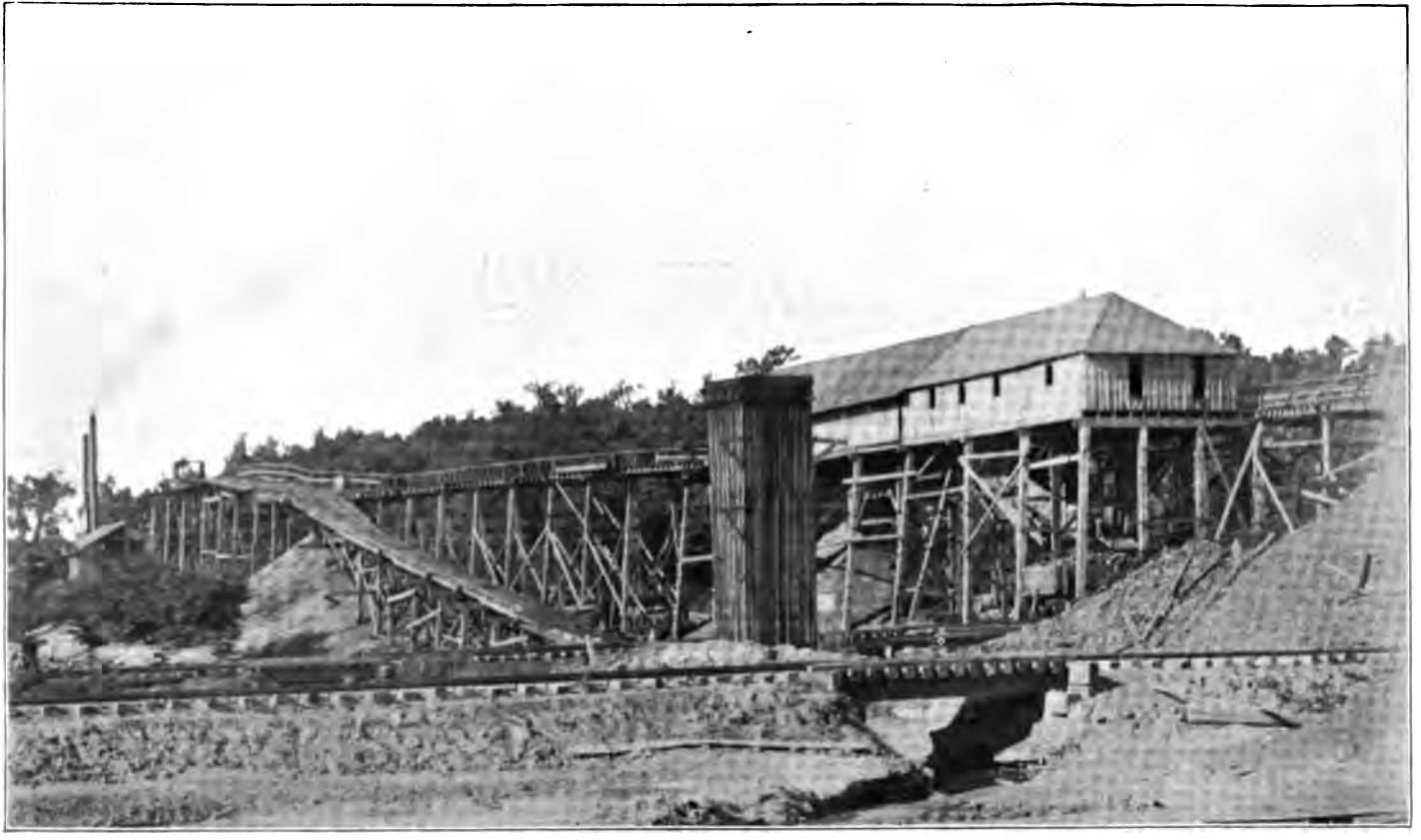
	Tons.
At Carbon, Ind. T.	49,859
At Jenson, Ind. T., strip pits (April, May, and June)	9,685

I do not recall any special improvements made during the year, except the opening of the strip pits at Jenson and the new opening near mine No. 50 at Carbon.

Yours, truly,

W. P. HEATH, *Secretary.*

Mr. L. W. BRYAN,
South McAlester, Ind. T.



JAMES DEGNAN & CO.'S MINES, WILBURTON, IND. T.

Mr. L. W. BRYAN: Below I give you production of Kansas and Texas mines for the past six months, ending June 30, 1899:

	Pounds.
Mine No. 52:	
January, mine-run coal	232,332
February, mine-run coal	224,364
March idle, account strike	None.
April, mine-run coal	31,716
May, mine-run coal	124,151
June, mine-run coal	168,842
Total	781,405
Mine No. 2:	
January, mine-run coal	108,168
February, mine-run coal	72,358
March, mine-run coal	523
April idle, account strike	None.
May idle, account strike	None.
June idle, account strike	None.
Total	181,049
Strip pit:	
January	None.
February	None.
March	None.
April, mine-run coal	9,447
May, mine run coal	10,601
June, mine-run coal	4,022
Total	24,070

KANSAS AND TEXAS COAL COMPANY,
Carbon, Ind. T., July 10, 1899.

MY DEAR SIR: Inclosed find production report for the past six months, ending June 30. You also wish to know of any new improvements. We are starting new slope No. 67, about three-quarters of a mile from No. 50, with 3½ feet of fine coal. Expect to commence to grade for railroad shortly and put in the latest improved machinery for handling the coal, with compressor and machines to push the entries ahead, with the expectation of making it one of the largest producing slopes in the district. Will have track room for 40 cars daily.

Putting in one new boiler now at No. 50 and No. 52 mine, expecting to increase our production at each of our present running mines.

Got new slope under cover and temporary chute and engine set ready to begin developments. Everything else going smoothly.

I remain, respectfully, yours,

H. WILSON, *Superintendent.*

L. W. BRYAN, Esq.,
United States Mine Inspector, Indian Territory.

Following are the rules adopted by the Kansas and Texas Coal Company:

RULES GOVERNING THE MINES OF THE KANSAS AND TEXAS COAL COMPANY IN THE INDIAN TERRITORY.

It is made the duty of the superintendent to see that each present employee of the company is furnished with a copy of these rules and that a copy is handed to each new employee when engaged, and that the special attention of all employees is called to the fact that they are required to make themselves familiar with these rules and be governed accordingly.

Pit or mine boss.—It is his duty to make daily examinations of all working places in the pit under his charge, or cause the same to be done by road men employed in such mine when he is unable to do so himself. He must see that all roads are kept clean and in good condition and doors for ventilation are kept in good order, so that a proper circulation of air will at all times be maintained in the mine. Also make daily examinations of all hoisting ropes, chains, and cages and all attachments thereto, and if any defects are found to report same to superintendent at once and put in order and safe condition. He is to have charge of the mine underground,

including top men and engineers, subject to the orders of the superintendent. It is his imperative duty to see that all these rules are enforced, and all employees in or about the mine are subject to his orders.

Engineers or hoisters are required to have their engine ready to move cages at 6 o'clock a. m., and all men and mules are ready to be in the mines before 7 o'clock. The hoisting and hauling must begin promptly on the sounding of the 7 o'clock whistle. They must at all times when on duty be where they can hear the signal gong to start and stop machinery and give it immediate attention. They are required to see that their machinery, boilers, and pipes are kept in proper condition, and their boilers cleaned out as often as once in every two weeks or at shorter intervals if found necessary, and at all times know that they have a sufficient amount of water in their boilers. Great care must be taken in cold weather to guard against freezing of pipes. All pipes must be properly drained and protected.

Weighmen.—They are required to correctly weigh the coal mined. They will see that the top house is kept clean, and will make such reports to general office as may be required of them.

Yard man.—He is required to have empty cars always ready to run under the chute without delay to take the place of loaded cars. He must examine all brakes and see that they are in working condition, and that all doors of box or stock cars are closed and properly fastened before being allowed to leave the mine, and to see that all cars are loaded as nearly as possible to capacity weight, and that all cars set under chute to be loaded are in proper condition to receive coal. When coal cars are found damaged by holes in floors or sides, boards must be securely nailed over such places to prevent loss of coal in transit. He will be subject to weighman's orders.

Road men are required to keep all roads and entries in proper and safe condition, take down any loose rock found, and make such places absolutely safe by timbering, and under no circumstances to permit any men or mules to be allowed to go into any entry or working place considered unsafe. They are required to examine carefully all main and cross entries and see that they are in safe condition. They will also examine carefully all track in main and cross entries and see that the same is kept in good repair. They will be at all times subject to the order of the pit boss.

Topmen or dumpers and gripman on top.—The duty of the gripman on top is to couple the empty cars (after being dumped) onto the rope and send same down the slope into the mine. He must exercise great care in attaching the grip to the rope, and know that it is properly adjusted to the rope and firmly gripped to it before permitting the car to leave the top. Topmen must receive the coal at the top landing, and dump the same without delay. They will assist the weighman in keeping the top house clean, and be subject to his orders.

Drivers.—They are required to have their mules properly cleaned and harnessed ready for work on blowing of the whistle at 7 a. m. Any driver who does not give his mule proper attention and good treatment, or who is known to abuse, mistreat, or injure his mules in any way shall be discharged. It is the imperative duty of the drivers to bring in props and timbers promptly whenever requested to do so by any miners working in rooms, entries, or on pillars from which coal is being handled. Any violation of this rule shall subject the driver to immediate dismissal. Drivers shall pull the empty cars to the face of the pitch rooms. They are also required to report all unsafe and dangerous places in the mine they find, as well as any unsafe track, and are forbidden to go into or drive over any track or through any place they consider unsafe.

Shot firers.—Miners are strictly forbidden to fire shots. Shot firers shall be employed for this purpose. Unless otherwise designated, the time for firing shots shall be 12 o'clock noon, when half time is being worked, and 5 o'clock evening when mine is working three-fourths or full time. Any miner or employee detected in breaking this rule shall have his turn stopped and shall be suspended for one week for the first offense, and for the second offense shall be discharged.

Shot firers must not fire shots unless coal is cut as specified in instructions to miners in these rules and the shot is otherwise considered proper and safe. Only one shot shall be fired at a time in any separate split of air, and the following shot not to be lit until the smoke is cleared away. No shot is to be fired while anyone except the shot firer is in the mine, and he shall not enter the mine for the purpose of firing until all of the men are out of the mine.

Gripman in mine.—His duty is to couple the car to the hoisting rope at each entry or lift to send the same to the top for dumping. He must exercise the greatest care in attaching the grip to the rope, and know that it is properly adjusted and firmly attached to the hoisting rope before permitting it to start the loaded car up the slope.

Miners.—All miners must be in the mines before the whistle blows at 7 a. m. All coal must be undercut 2 feet in rooms, or sheared on the rib, or cut in center to a depth of 4 feet the full thickness of the seam or vein of coal, and no shot to be placed so that the point of the shot or any part of the powder be more than 4 feet

from the face or more than 2 feet beyond the undercutting. All entries or narrow work under 12 feet wide to be undercut, sheared, or cut the full depth of holes drilled for blasting.

It shall be the duty of every miner to keep his room or working place in good order and repair and perfectly safe in every way. He is hereby forbidden to continue at work in any place found unsafe until the same is made safe. Any miner who shall willfully and negligently or carelessly suffer his room to get out of order and repair shall, upon request, put same immediately in repair; and in event of his failure to do so when ordered, the company will do the work required and charge the cost of same to the miner.

Care must be taken in loading mine cars to prevent loss to both miners and the company by coal falling off and causing wreck on slope.

Miners must remove all slate from their coal while loading it in their cars. Any miner sending out slate in his coal car shall, for the first offense, be docked; for the second, be suspended one week; for the third, be discharged. Miners must run their loaded cars down their rooms to the parting, but not out on the entry.

Miners driving entries must have roadway brushed 5 feet from rail; ties shall be 2½ feet apart in roadway, and sunk on upper side before roadway is measured.

GENERAL RULES.

It is the duty of every man working in the mine who discovers any place that is not safe to at once notify the pit boss or roadman, that the same may be put in proper condition. It is earnestly desired that all employees shall pay strict attention to this requirement, as it is the effort of this company to have the safety of the men considered before anything else.

Any miner or employee who shall intentionally damage any signal bell or wire, safety lamp, brattice, airway, or door, or open a door and not close it again, or do anything by which the safety of the men may be endangered, shall be promptly discharged.

All persons employed in the mine are strictly forbidden to ride up or down the slopes, and all men that may require to leave the mine while hoisting is being done shall travel out the manways.

All employees who desire to absent themselves from work must notify the foreman under whom they work the day before. Anyone absent without permission will for the first offense be suspended three days, and for the second offense be suspended one week, and for the third offense be discharged. All miners absenting themselves three consecutive days without permission will be considered as having left the employ of the company, and their places will be assigned to others.

No miner who has left the employ of the company or who has been discharged from the same shall be entitled to any pay or money due him until he shall have put his room in working order, as required by the company. All miners leaving said employment shall be required to secure the certificate of the pit boss that they have complied with this rule before final payment or settlement shall be made.

Any tenant of the company shall be charged for any damage done to the house he occupied; and upon leaving its service, whether voluntary or discharged, will not be entitled to receive any part of the wages due him until he shall have vacated the premises occupied by him and presented the keys of the same at the office and the house has been examined and amount of damages, if any, deducted from his wages.

No person shall be allowed to interfere with the employers' just right of employing, retaining, or discharging any person or persons whom the superintendent or mine boss having charge of the mine may consider proper, or to interfere in any way, by threats or otherwise, with the right of any employee to work in any way and upon any terms and with whom he may think proper and best, under penalty of being discharged.

Anyone detected violating any of the above rules for which no penalty is named will, for the first offense, be suspended three days, for the second offense be suspended one week, and for the third offense will be discharged.

Entering the employment of the company is understood to be an acceptance of the foregoing rules.

B. F. HOBART, *President.*

OSAGE COAL AND MINING COMPANY.

MINE No. 10.

This mine is in practically the same condition as at date of my last report, except that there has been some extension of the workings. James Miller is mine boss. There has been one accident which was not fatal, particulars of which are given below. The works and equipment

of this mine have been fully described in my previous reports, and very little change has been made except to extend this mine so as to connect with mine No. 11, it being expected that this mine (No. 10) will reach the limit of its practical usefulness in a very short period and be abandoned.

January 23, 1899.—John Morrison (Scotch), night gasman; age, 48; single. This man's duty was to follow the shot firers and see that no coal was set on fire by the shots and to look after the condition of the mine in general during the night. He went into room No. 78, "K" entry, after the departure of the shot firers and found that one of their shots had failed to explode. He put the squib in the needle hole and lighted it with his lamp. The shot went off before he could get to a place of safety and a piece of coal thrown out by the shot struck him, fracturing his left arm between elbow and wrist.

MINES Nos. 11 AND 11½.

These two shafts are connected by underground works and are operated as one mine, the coal all being hoisted at No. 11 shaft, shaft No. 11½ being used as an escapement and fan shaft, and also for the purpose of hoisting and lowering timber and material to the mine and men in case of an accident, it being equipped with a hoisting engine and a large fan and fan engine. At this point the water, which is liable to accumulate in this and the adjoining old works of No. 9, is kept clear by proper pumps.

The capacity of this mine is from 800 to 900 tons per day and furnishes employment to about 300 men. No. 11½ shaft is 230 feet deep and is equipped with large hoisting engine furnished with steam by two boilers. Cage is provided with approved safety catches and overhead covers, and is especially used for hoisting men and material, being constantly held in readiness for that purpose. This shaft has two fans, one running continually and the other held in readiness for emergencies. Each of these fans has a capacity of 35,000 cubic feet of air per minute. Proper pumps are kept in order at No. 11½ to keep that portion of the mines free from water.

No. 11 shaft is 470 feet deep. Cages are fitted with safety catches and overhead covers. Electric power is furnished by a 135-horsepower General Electric dynamo, which dynamo is driven by a 150-horsepower Ideal steam engine. There are two electric pumps and one steam pump in this mine. A hoisting engine at the head of the slope is used for hoisting coal from the various entries in the mine turning off the slope, and a plane engine for lowering coal from entries on the plane. The foot of the shaft is lighted by electricity. Six boilers supply steam for the machinery.

Ventilation is abundant, being supplied by the fan at No. 11½ and also by a fan at old mine No. 7. Air courses are kept in good condition, and proper stairway is provided. Numerous guideboards indicate the way of escape for men in case of accident. William Strong is mine boss.

There have been three accidents, one of which proved fatal, in which one of the men lost his life by electrocution, the only incident of this kind which has occurred in the Territory. Full particulars of these accidents are given below:

September 16, 1898.—Thomas Flynn (American), sprinkler, age 26, single. Killed by electric shock. This mine has been free from accidents for the past two years, and is the same mine in which nearly 100 lives were lost in 1891 by dust explosion. The rooms and entries are now, and have been for a number of years, sprinkled to keep down the dust. In this case Thomas Flynn was assisting in sprinkling, and in some way came in contact with the electric wire or cable that carries the electric current to the mining machines, and the circuit was completed through his

body. Had the men near him had presence of mind they could have pulled him away, possibly receiving a slight shock themselves, but as the number of volts was not over 200 it would not be dangerous unless sustained for a number of minutes. This is the first accident of this kind that has occurred, though a number of the larger mines are using electrical machines both for cutting coal and running pumps.

January 17, 1899.—John McGurk (Scotch), roadman, age 65, married. Fall of slate causing broken leg, near ankle. He was attempting to lay some track in "N" entry, and finding a prop in his way knocked it out without first examining the roof, permitting a piece of slate to fall, which struck and knocked him down. In his efforts to extricate himself he twisted his right foot so as to break one of the small bones near the ankle.

May 8, 1899.—Domenic Boggio (Italian), miner, age 30, married. Fall of coal causing broken leg. This man was engaged in his room, No. 30, in "H" entry, in mining off a standing shot when a piece of coal suddenly fell, catching his leg and causing a compound fracture of the left tibia and fibula.

MINE NO. 5.

This mine is operated on the long-wall system, of which previous notice has been made, this being the first successful attempt to introduce this system of mining in the Indian Territory, and it is gratifying to note that the mine is still being worked successfully. The face of the coal has been advanced considerably during the past year. An electric locomotive for haulage purposes has been in use in this mine with success and a second one added this year.

The shaft is 485 feet deep. Self-dumping cages with approved safety catches and overhead covers are provided. Upper and lower landings are provided with gates. Hoisting engines are first-motion double engines with 16 by 28 cylinders and 8-foot drum. Steam is supplied by a battery of six boilers, each 60 inches by 22 feet, which furnish steam for hoisting engines, fan engines, pumps, conveyors, electric dynamo, dynamo engine, and other machinery. Ventilating shaft and escapement with a 15-foot Crawford & McCrimmon fan furnishes abundant air, and proper stairway is provided for escape of men; traveling ways are in good condition. Metal speaking tube and all other requirements of law are provided.

Coal is mined by two Sperry electric long-wall mining machines, the necessary power being generated by a 175-horsepower Westinghouse dynamo driven by an Ideal engine with 16 by 16 inch cylinder, the dynamo and engine house being furnished with the latest improvements for indicating the power, etc., of the electric machinery, with switchboards, rheostat, insulating brackets, Westinghouse round dial ammeter and Weston round dial voltmeter, mounted on marble slabs. The mine has a capacity of about 800 tons per day and employs about 150 men. John Hopkins is mine boss.

Two accidents occurred at this mine during the year, one of which proved fatal, particulars of which are given below:

September 14, 1898.—Angelo Lucian (Austrian), timberman, age 49, married. Fall of slate. This man's duty was to follow the machines and timber up the loose rock or slate. In this case he was about to timber up a loose piece of slate, having set up some props in room No. 7, and was passing along the face to room No. 8; when about half way the fall occurred and caught him, killing him instantly. Examining the place I find there was a slip which ordinarily would not be discovered until the actual fall of the slate. This man had been in the employ of the Osage Company for the past six years and was an experienced and first-class timberman.

April 6, 1899.—William Horton (American), miner, age 27 years, single. Burned and leg broken by effect of brushing shot. He was employed in brushing the entry in this mine, had fired one shot and had placed a squib in the hole for a second shot, but the presence of a small quantity of gas put out the squib. He went back to take the squib out of the needle hole, and in doing so ignited the gas there present by raising his lamp to the roof. This ignited gas in turn ignited the squib, and the shot went off there before he had time to escape. He was not seriously injured and recovered rapidly.

SLOPE MINES.

The Osage Coal and Mining Company is operating, in addition to their shafts as above described, the following slope mines:

Homer's slope, on the crop of coal above old No. 7 mine, has been driven in some distance and entries turned at right angles, beside rooms being turned directly off the main entry. This slope is equipped with a hoisting engine and 40-horsepower portable boiler. This slope is well ventilated by an air shaft and stack.

Clelland & Scrimgeour slope mine is located about a mile and a half west of Carbon, and the works have been extended during the past year. Ventilation is had by stack and furnace. Escapement is had by an entry driven out to the crop, and the mine is kept in fairly good condition and is equipped with a portable boiler and small hoisting engine. The coal is conveyed by tramway on which is laid T-iron, over which the mine cars are hauled by mules to the tipple, three-fourths of a mile distant to the branch of the Missouri, Kansas, and Texas Railway that runs to Carbon. There was one accident in this mine last year, a fatal one, particulars of which are given below:

September 18, 1898.—Simon Schools (Polander); miner; age, 45; married. Fall of slate causing fracture of two ribs and puncture of right lung, with slight scalp wound. This mine, the property of the Osage Coal and Mining Company, is operated by Clelland & Scrimgeour under contract. Schools was working in room No. 3, which he failed to properly timber. He had props in his room which he had failed to set up, and, striking a slip in the roof it feel upon him without warning, killing him instantly.

Church's Slope is located about one-half mile west of the coke yard of the Osage Coal and Mining Company at Krebs, and is in a piece of coal lying between the old abandoned mines No. 9 and No. 5. This slope is driven in about 1,000 feet, the upper works having broken into old No. 5, while the lower works have a considerable distance to go before breaking into the old works of the abandoned mines, on each side of which there is a large piece of good coal that will be taken out of this mine. This mine is equipped with one large single-hoisting engine, the coal is dumped over a tipple on the Krebs branch of the Missouri, Kansas and Texas Railway. There have been no accidents at this slope within the past year.

Carley's Slope, which was in operation at the time of my last report, has been worked out and abandoned.

I append hereto a copy of the rules in force at the mines of the Osage Coal and Mining Company. Also letters from Mr. William Cameron, superintendent, giving further details of production and other matters.

The total output of the Osage Coal and Mining Company at Krebs, Ind. T., for the past year was: Screened coal, 184,323 tons; screenings, 54,653 tons; total, 228,976 tons.

KREBS, IND. T., *January 16, 1899.*

L. W. BRYAN, Esq.,
United States Mine Inspector, South McAlester, Ind. T.:

Herewith, statement of output, average number of men employed, coke manufactured, powder used, etc., for six months ending December 31, 1898, by Osage Coal and Mining Company at Krebs, Ind. T.

	Tons.
Screened coal	91,478
Screenings	26,800
Total	118,278
Average number of men employed	618

NO. 11. OSAGE COAL AND MINING COMPANY, KREBS, IND. T.

NO. 5. OSAGE COAL AND MINING COMPANY, MCALESTER, IND. T.

Amount of powder used.

	Kegs.
Saltpeter powder	1,787
Soda	1,654
Total	3,441

Average number of days worked for all mines for six months..days each..	18
Amount of coke manufactured for six months.....tons..	8,670.90

Yours, truly,

WILLIAM CAMERON, *Superintendent.*

KREBS, IND. T., *July 15, 1899.*

DEAR SIR: In compliance with your request of June 28 I herewith send you the following statement of output, average number of men employed, coke manufactured, etc., by the Osage Coal and Mining Company at Krebs, Ind. T., for the six months ending June 30, 1899:

	Tons.
Screened coal	92,845
Screenings	27,853
Total	120,698

Average number of men employed	510
Average number of days worked per month for all mines .....days..	23

Amount of powder used during six months.

	Kegs.
Saltpeter powder	2,239
Soda powder	1,534
Total	3,773

Amount of coke manufactured during six months.....tons..	7,466.10

During the six months ending June 30, 1899, we started to reopen Mine No. 8, which was abandoned something like thirteen years ago. We have pumped the water out of old shaft and retimbered same, also cleaned bottom of shaft and timbered same, have timbers for headgear partly prepared and some of the machinery on the ground, and if railroad tracks are promptly put in we expect to commence producing coal from this mine early in the fall.

Owing to a strike declared by the United Mine Workers in this Territory on March 1st, the output of our mines from that time to June 30 has been curtailed at least one-third. The majority of men working at Krebs not belonging to the United Mine Workers continued at work, only those that did belong to the union leaving the service of the company.

Yours, truly,

WILLIAM CAMERON, *Superintendent.*

L. W. BRYAN, Esq.,
United States Mine Inspector, South McAlester, Ind. Ter.

Following are the rules of the Osage Coal and Mining Company:

DUTIES OF THE BOSSES.

Rule 1.—Each fire boss shall enter the mine before the men have entered it, and before proceeding to examine the same he shall see that the air current is traveling in its proper course; and if he finds the air traveling properly, he shall then proceed to examine the workings.

Rule 2.—He shall not allow any persons except those duly authorized to enter or remain in any part of the mine through which a dangerous accumulation of gas is being passed in the ventilating current from any other part of the mine.

Rule 3.—On entering the mines in the morning before the men have entered he shall proceed to examine the same and mark all rooms or working places in the following manner:

The day of the month, thus, 30, indicates that inspection has been made and that the room or working place is free from fire damp.

Two large crosses with the day of the month between them, thus, X30X, indicates

the presence of fire damp and extreme danger. These marks must be made on a cap piece or other timber and laid in the roadway at mouth of room or entrance to working place.

Rule 4.—After complete examination has been made he shall proceed to the bottom of the shaft and signal to the engineer that the workmen may now descend the shaft. In mines where there are more than one fire boss each fire boss shall allow only such men as work in the portion examined by him to proceed to their working places, and shall detain all others until the arrival of the fire boss who has examined their working places. Should he have found explosive gas or fire damp in any of the working places he shall personally notify the men working in such places as to the danger and warn them not to proceed to work until he has removed the danger. After notifying the men working in places where he has discovered fire damp it will be his duty, as speedily as possible, to take the necessary steps to remove the fire damp and render the place safe for work. He will then notify each man that his place is now free from fire damp. In removing the fire damp it will be his duty to see that the gas so removed will not be carried on the naked lights in the return stairway.

Rule 5.— It will be his special duty at all times to see that the air is moving in the proper manner; to look out for falls in the air courses and to remove them, if possible. Should the fall or falls be too large for him to remove personally, he will notify the mine boss, whose duty it will be to assign sufficient force to have them removed as speedily as possible.

DUTIES OF MINERS.

Rule 6.—As quantities of explosive gas or fire damp are generated in these mines, the miner will take special care in entering his room or working place to notice the cautionary marks made for his protection, the marks being made on cap piece or other timber laid in the roadway at the mouth of room or entrance to working place, the marks being as follows:

The day of the month, thus, 30, indicates that inspection has been made and that the room or working place is free from fire damp.

Two large crosses with the day of the month between them, thus, X30X, indicates the presence of fire damp—extreme danger. In case the mark indicates the presence of fire damp, the workman shall not, under any circumstances, enter such room or working place until the fire boss has again inspected and rendered the place safe.

Rule 7.—The miner shall each day examine his working place before beginning work, and take down all dangerous slate, or otherwise make it safe by properly timbering the same before commencing to dig or load coal, and he shall at all times be very careful to keep his working place in a safe condition during working hours.

Rule 8.—Should he at any time find his place becoming dangerous from any unusual condition that may have arisen, he shall at once cease working and inform the mine boss or his assistant of such danger.

Rule 9.—Every miner shall order props, cap pieces, or other necessary timbers from the driver who brings him his cars. The miner shall always keep on hand a sufficient quantity of props, cap pieces, and other necessary timbers, and shall order the same in advance, so that the driver may have time to bring them. Should the miner, from any cause, have no props or other necessary timbers on hand, he shall immediately cease work, vacate his working place, and report the fact to the mine boss.

Rule 10.—All coal must be undercut at least 2 feet in rooms, and no shot be placed so that the point of the shot or any part of the powder shall be more than 4 feet from the face or more than 2 feet beyond the undercutting. All entries or other narrow work under 12 feet wide to be undercut to full depth of holes drilled for blasting.

Rule 11.—In case timbers are blown out, causing falls at the working face, owing to the negligence of the miner, he will be required to clear such falls at his own expense. The company will only assist where the roof was known to have been bad or there was no negligence shown on the part of the miner.

Rule 12.—Any miner loading "bony" coal or any foreign matter with his coal shall, for the first offense, be suspended one day; for a second offense, be suspended one week; and for the third offense, shall be discharged.

DUTIES OF DRIVERS.

Rule 13.—When a driver has occasion to leave his trip or when his trip for any cause is stopped anywhere except at a regular station, he must see that it is left when possible in a safe place, secure from cars or other dangers or from endangering drivers or trips following, and if the trip is left in a main hauling way he must go back and notify approaching drivers, if any, of the existing obstruction, that they may be enabled to stop their trips and avoid collisions.

Rule 14.—The driver must take care in taking his trip down grade to have the sprags so adjusted that he can keep the cars under control and thus prevent accidents.

Rule 15.—On receiving orders from workmen for props, cap pieces, or other necessary timbers, the driver will bring the same with all possible dispatch, and in case, for any reason, they can not be obtained, he will report the fact to the workman so ordering and also to the mine boss.

DUTIES OF ROPE RIDERS.

Rule 16.—The position of rope rider being one of peculiar hazard, he must use special care and precaution to avoid the dangers incident thereto.

Rule 17.—He shall exercise great care in seeing that all couplings are safe for use and see that all trips are properly coupled before starting; and should he, at any time, see any material defect in the rope, link, hook, or chain, he will immediately remedy such defect, and if unable to do so, he shall detain the trip and report the matter to the mine boss.

DUTIES OF CAGERS OR MEN ASSIGNED TO THAT POSITION.

Rule 18.—The cager shall be at his proper place at the bottom of the shaft when men begin to descend in the morning and remain there until hoisting of coal commences. He shall see that men are safely off the cage and then signal the engineer. He shall be at his proper place at the time the hoisting of coal ceases and men commence to be hoisted in the evening, and shall see that not more than six persons get on the cage at any one time, and when they are safely on the cage he shall signal the engineer to hoist them. The man acting as cager during the hoisting of coal shall see that all cars are safely held on the cage by the catch provided for that purpose before signaling the engineer. He shall not allow any tools or material of any kind to be placed on the same cage with men or boys, nor on the opposite cage when men are being hoisted out of the mine or lowered into it, except when for the purpose of repairing the shaft or the machinery therein. The men shall place their tools in cars provided for that purpose, which car or cars shall be hoisted or lowered before or after the men have been hoisted or lowered, and he shall immediately inform the mine boss of any violation of this rule. In signaling the engineer the cager shall use the signals as directed in general rule No. 43.

DUTIES OF SHOT FIRERS.

(The rule governing shot firers apply only to mines worked on the room and pillar plan, such as mines Nos. 10 and 11, and do not apply to mines worked on the long-wall plan, such as mine No. 5).

Rule 19.—Shot firers must not fire any shots unless the coal is properly cut in accordance with the two following sections, nor unless said shot is otherwise and in all respects proper and safe.

SEC. 1. All coal must be undercut at least 2 feet in rooms, and no shot to be placed so that the point of the shot or any part of the powder shall be more than 4 feet from the face or more than 2 feet beyond the undercutting.

SEC. 2. All entries or other narrow work under 12 feet wide to be undercut to full depth of holes drilled for blasting.

Rule 20.—Shot firers must fire only one shot at a time in any separate split of air, and the following shot must not be lit until the smoke has cleared away.

Rule 21.—No shot to be fired while any one except the shot firers are in the mines, except by special permission of the mine boss, and the shot firers shall not enter the mine for the purpose of firing until all of the men are out of the mine.

Rule 22.—Shot firers must commence firing at a point farthest from the intake air way, and proceed with the firing in a direction opposite to that in which the air is traveling.

DUTIES OF TOPMEN OR MEN ASSIGNED TO THAT POSITION.

Rule 23.—He shall be at his proper place in the morning from the time the persons begin to descend into the mine, and shall remain there until the hoisting of coal begins. He shall see that no more than six persons get on that cage at any one time, and he shall not open the gate until cage has been placed in position to receive men. After the hoisting of coal ceases in the evening it shall be his duty to be at his proper place until all the men are hoisted from the mine. He shall see that men get safely off the cage, and shall then signal the engineer in the proper manner. He shall not allow any tools or material of any kind to be placed on the same cage with men or boys, nor on the opposite cage when men are being lowered into the mine, except for the purpose of repairing the shaft or the machinery therein. The men shall place

their tools in cars provided for that purpose, which car or cars shall be lowered before or after the men have been lowered. In signaling the engineer the topman shall use the signals as directed in rule No. 43.

Rule 24.—At shafts not using self-dumping cages the topman shall see that the stops for cages to rest upon are kept in good working order, and he must remove loaded cars carefully, and in placing empty cars on cage he must see that the car is securely held by the catch provided for that purpose before signaling the engineer.

DUTIES OF ENGINEERS.

Rule 25.—It shall be the duty of the engineer to keep careful watch over his engine and all machinery under his charge, and see that the same is in proper working order before attempting to raise or lower men or material.

Rule 26.—He shall see that the boilers are properly cleaned and inspected at proper intervals and the steam pressure does not exceed at any time the limit allowed by the superintendent.

Rule 27.—He shall not allow any unauthorized person to enter the engine house; neither shall he allow any person to handle or run the engine without the permission of the superintendent.

Rule 28.—When workmen are being raised or lowered he shall take special precautions to keep the engine well under control.

Rule 29.—The engineer will observe and operate his engine in accordance with the general and special rules governing signals. (See general rule No. 43.)

DUTIES OF FIREMEN.

Rule 30.—Every fireman or other person in charge of a boiler or boilers for the generation of steam shall keep a careful watch of the same. He shall see that the steam pressure does not exceed at any time the limit allowed by the superintendent. He shall frequently try the safety valves and shall not increase the weight on the same. He shall maintain a proper depth of water in each boiler, and if anything should happen to prevent this, he shall report the same without delay to the engineer and take such other action as may under the peculiar circumstances be necessary for the protection of life and preservation of property.

RULES AND REGULATIONS IN REGARD TO POWDER.

Rule 31.—All persons, except those appointed by the coal company or the mercantile company having charge of the powder sales, are prohibited from entering the powder house on any pretense whatever.

Rule 32.—The use of tobacco in any form by any person while in the performance of his duties in and around the powder house is strictly prohibited; neither shall any person enter a powder house with matches or any other ignitible material about his person.

Rule 33.—No powder keg shall be opened in any other manner than by the slide or lead plug provided for that purpose. It is strictly prohibited to use a plug of any kind to drive through the end of a powder keg for the purpose of opening the same.

Rule 34.—It will be the duty of those authorized, who perform this work, to see that no person enters the powder house while said work is in progress; also to govern their actions by the above regulations.

Rule 35.—No lights of any kind shall be allowed in or around the powder house.

Rule 36.—No powder or high explosives shall be taken into the mine by any one man in greater quantities than required for use in one day (unless such quantity be 5 pounds or less), and all powder shall be sent or carried into the mine in metallic canisters.

Rule 37.—Powder must be kept in proper air-tight powder cans, and the cans must be kept in a close, tight-locked box, said box to be at least 300 feet from any working face, and only at points designated by the mine boss.

Rule 38.—Whenever a workman shall open a box containing powder or other explosives, or while in any manner handling the same, he shall first place his lamp not less than 5 feet from such explosives in such a position that the air current can not convey sparks to it, and he shall not smoke while handling explosives.

GENERAL RULES.

Rule 39.—No person shall be allowed to enter any mine, except employees working in the mine, without permission of the superintendent.

Rule 40.—No person in a state of intoxication shall be allowed to go into or loiter about any mine.

Rule 41.—No person shall be allowed to travel on foot to or from his work on any incline, plane, or slope when other good roads are provided for that purpose. As each mine is provided with a pass way around the shaft at the bottom, all persons employed in the mine or others are strictly forbidden to cross over from one side of the shaft to the other side, through the hoisting compartment, under any circumstances whatever.

Rule 42.—Workmen and all others are strictly forbidden to commit any nuisance, or throw into, deposit, or leave coal, dirt, or stones, or other rubbish in the air courses or roads so as to interfere with, pollute, or hinder the air passing into or out of the mine.

Rule 43.—In all shafts or slopes where persons, coal, or material of any kind are hoisted or lowered by machinery, the following code of signals shall be used:

One signal: To hoist coal or other material.

One signal: To stop cage or car when in motion.

Two signals: To lower cage or car.

Three signals: That persons are to be hoisted; on hearing which the engineer will signal back "ready" by giving one signal. On hearing the last-named signal, the persons will get on car or cage, and when they are safely on car or cage one signal shall be given the engineer to hoist. After the hoisting of coal has ceased in the evening and the 5 o'clock whistle has blown, it will only be necessary to give the first three signals for the first three cages of men hoisted, after which one signal, "ready," will be given for each cage until the men are all out.

Four signals: That mules are to be hoisted; on hearing which the engineer will signal "ready" by giving one signal. On hearing the last-named signal, the mule will be placed on the cage, and when it is safely on the cage one signal shall be given the engineer to hoist.

Five signals: Turn steam onto slope or underground engines.

Six signals: Shut steam off from slope or underground engines.

Rule 44.—No person shall go into any old or abandoned part of the mine or in any other place which is not in actual course of working without permission of the mine boss, nor shall they travel to or from their work except by the traveling ways provided and assigned for that purpose.

Rule 45.—No person in the mine shall be allowed to enter any room or working place except the working place to which his duties call him. It is strictly forbidden for any person to visit a room or other working place except his own, either during the presence or absence of its proper occupants. All boys or other persons assigned to special posts as trappers or otherwise, must remain at their posts while on duty.

Rule 46.—All miners must be in the mine before the 7 o'clock whistle blows in the morning. Drivers must have their mules out of the stable and ready for work when the whistle blows at 7 o'clock.

Rule 47.—Any person found with tools or powder belonging to another or taking or using tools or powder belonging to another without the owner's consent, shall, for the first offense, be fined $2.50, and for the second offense he shall be discharged, such fines to be paid to the owner of the tools and collected at the company's office, and any person detected in exchanging checks on pit cars shall be immediately discharged.

Rule 48.—Any miner or employee who shall damage any signal bell or wire, brattice, air way, or door, or open a door and not close it again, or do anything by which the safety of the men or mine may be endangered, shall be promptly discharged.

Rule 49.—Whenever it shall be the duty of any person to go into the "sump," or space below the cage at the bottom of the shaft, for the purpose of cleaning out, removing dirt, or otherwise, they shall first place a prop, or props of wood or iron, in such a manner as to arrest the cage should it from any cause be made to descend, and thus secure themselves or others from possible danger.

Rule 50.—All employees who desire to absent themselves from work must notify the foreman under whom they worked the day before; and any one absent without permission will, for the first offense, be suspended three days, and for the second offense be suspended one week, and for the third offense be discharged, except in case of sickness.

Rule 51.—Any persons, except those duly authorized, are forbidden to meddle or tamper in any way with any electric or signal wire about the mine.

Rule 52.—No miner or other employee shall be entitled to receive his time at the company's office until he shall obtain from the mine boss a clearance card; and in case of employees renting a company house, a note must be obtained from superintendent's clerk, stating the amount of rent due.

Adopted July 24, 1897.

WILLIAM CAMERON, *Superintendent.*

Approved:

R. M. MCDOWELL, *General Manager.*

OSAGE COAL AND MINING COMPANY, KREBS, IND. T.

NOTICE.

The mines in this district generate explosive gas, commonly known as fire damp. The attention of all employees is especially called to the company's rules Nos. 1, 2, 3, 4, 6, 44, 45, and all other rules, that all persons in the mines may be protected from this existing danger.

Windy or blown-out shots are liable to cause explosions, and in order to avoid and prevent this danger all shots must be carefully prepared in accordance with rules Nos. 10 and 19.

Miners are responsible for the safe and secure propping of the rooms in which they work, and each must see that his working place is carefully examined and made safe, in order to avoid accidents from falls of slate or coal.

Each employee must make himself thoroughly acquainted with all the rules of this company. He must strictly observe these rules and promptly report to the superintendent any infraction or disregard of the rules that comes to his notice.

Note and observe carefully all the rules and regulations in regard to powder, explosive gas, preparation of shots, and propping and otherwise making working places safe.

WILLIAM CAMERON, *Superintendent.*
R. M. MCDOWELL, *General Manager.*

JULY 24, 1897.

SAMPLES COAL AND MINING COMPANY.

This mine is located about a mile west of the town of McAlester, Ind. T. Considerable extension has been made during the past year and the entries have been opened up and driven some distance; the manner of mining has been changed, the rooms now being driven up hill and the coal slid down to the mine car, this mine having a dip of 35°. The coal is about 4 feet in thickness. Ventilation is had by air shaft and furnace. Two fans have been purchased and one will be erected on each side of the slope which will make the ventilation complete. The present equipment of this mine is a small Ledgerwood hoisting engine and boilers. Two new boilers have been purchased and they have purchased a large double engine and double friction drum; besides they have erected a number of miners' houses and have built a track from the Missouri, Kansas and Texas Railway direct to this mine and the coal is being dumped into the cars at the mines, while heretofore it has been hauled by teams and wagons to the town of McAlester and there loaded into railroad cars. The Samples Coal and Mining Company has been organized and money enough is now being invested to make this quite a successful mine. The output for the past year was 24,350 tons. There are no accidents to report.

SOUTH MCALESTER, *July 27, 1899.*

DEAR SIR: In accordance with your request, allow me to give you some information concerning the Samples Coal and Mining Company.

Our output for the last six months has amounted to, in round numbers, 15,000 tons. By the first of November, with the improvements we are making, we will easily be able to place on the cars at least 200 tons per day. Our improvements consist of new houses, engine, boilers, fans, etc., costing $11,000. Our aim is to bring our equipment up to the very best standard. Our product is as fine a quality of coal as is found in this district.

Yours, truly,

THE SAMPLES COAL AND MINING CO.,
WM. BUSBY, *President.*

Mr. L. W. BRYAN,
United States Mine Inspector, South McAlester, Ind. T.

D. EDWARDS & SON.

This firm is operating two slopes about one-fourth of a mile apart, which mines are located about a half mile from the town of McAlester, and situated on a branch from the main line of the Missouri, Kansas

and Texas Railway, being the same branch referred to in the foregoing report as running to the mine of the Samples Coal and Mining Company. The dip of the coal in this mine is about 30° to the south and the coal is 4 feet in thickness. Slope No. 1 is down about 800 feet, or about three lifts, and connection is made between Slope No. 1 and No. 2, which provides escapement from either of the mines. Ventilation is had by a 10-foot fan. Both slopes are equipped with necessary engines and boilers. This firm is contemplating extensive improvements at these mines, and have the necessary houses and other appliances in connection with the mines. The output of these two slopes for the past year is 7,531 tons. There have been no accidents to report.

D. Edwards & Son—Fairview Mine.

In August, 1898, the Kiowa Coal Company, a company which had been operating at Kiowa and Savanna, passed into the hands of a receiver appointed by the United States court, and all of their property was sold. A portion of the assets of the company consisted of a plant at Fairview which was purchased by D. Edwards & Son and has been operated by them since that time. The coal in this mine is very steep, being about 70° in pitch, and the bottom is very soft. On top of the coal is a layer of "bony" coal, and owing to the steepness of the pitch and the presence of the bony coal, it is impossible to work this mine profitably. It is the intention of D. Edwards & Son to remove all this machinery to a point about 2 miles directly east of the town of Kiowa, at which point this firm has secured two leases. The output from the Fairview mine for the past year has been 1,192 tons. There have been no accidents to report.

Hailey & Co.—Savanna.

This firm is operating in a small way on the property originally owned by the Kiowa Coal Company, near Savanna, Ind. T., and immediately east of Savanna is Hoyt's slope, from which a small output of coal is made, the output for the past year being 216 tons. There have been no accidents.

Not quite a mile south from the Hoyt slope, Canning & Gordon are sinking a new slope which will be a small producer, and the coal will be hauled from this point to the Missouri, Kansas and Texas Railway. No output from this mine up to the present time. No accidents to report. The coal at this point is about 4 feet in thickness with a dip of 60°. Suitable equipment will be provided as the work progresses.

M. Peroni, Slope Mine.

This small slope, operated by M. Peroni, is about a quarter of a mile south of the last-described mine. The output for the past year has been 100 tons. No accidents to report.

Johnsville Mine.

Owned by R. Sarlls, and is now being operated on a small scale by an opening that has been made about a thousand feet south of the old opening that had been formerly operated by the Choctaw Coal and Mining Company. When Mr. Sarlls became the owner of this property the machinery that had been installed at the first slope had been

removed by the old company. The first slope had been driven in some 750 feet and considerable money spent. Arrangements are now being made by which 5 or 6 miners are going to work the mine on the cooperative plan. They have secured a small pair of hoisting engines and boiler and are now cleaning it up preparatory to shipping coal. A small working, before mentioned, adjoining this mine on the south, is being operated on a small scale, using horse power for hoisting the coal. The output for the past year has been very small, being about 300 tons.

St. Louis and Galveston Coal and Mining Company.

At a point about 3 miles northeast of Atoka, on a branch of the Missouri, Kansas and Texas Railway, a railroad is being built to a point about 3¼ miles west of said branch, at which latter point the St. Louis and Galveston Coal and Mining Company have commenced operations. A slope mine is being sunk in a vein running from 3½ to 4½ feet thick, which underlies the Lehigh vein, probably about 1,000 feet. This company is building the railroad mentioned, and are now putting in an equipment consisting of 25-horsepower hoisting engines and portable boiler for sinking purposes. Air shaft for ventilation and proper escapement is in progress. The slope is down about 500 feet, and the first lift is about to be turned. The pitch of the vein is about 50° to the north. This company owns two leases, and will, as the work progresses, provide all necessary equipment. They own their own locomotive and their track, at this writing, is nearly completed; they have erected a tipple and put in railroad scales, and are awaiting the completion of their railway so as to be ready to ship coal. No product and no accidents to report.

Atoka Coal and Mining Company.

LEHIGH MINES Nos. 5 and 5½.

But little change is to be noted in these mines since my last report except the ordinary extension of the workings. No. 5½ shaft furnishes escapement, ventilation, and rope haulage for No. 5. There are suitable engines and boilers for the rope haulage, which rope haulage extends from the foot of No. 5½ shaft to the foot of No. 5 shaft. There is a slope with three lifts and a plan with two lifts at the foot of No. 5½ shaft, the coal from these lifts being delivered at the foot of No. 5 shaft by the rope haulage mentioned.

No. 5 shaft is 201 feet deep and is equipped with a pair of double engines with 12 by 24 inch cylinders. A battery of three boilers furnishes steam for all machinery. At the foot of No. 5 shaft a slope is driven with five lifts, at the head of which is a single hoisting engine which handles the coal. Ventilation is had by means of two 10-foot Crawford & McCrimmon fans placed at an upcast ventilating shaft, situate about 200 feet from No. 5 shaft, and a 12-foot fan of same make at No. 5½. Abundant air is furnished to meet the requirements of the law, the system in use in this mine being that of splitting the air at each entry, which gives each entry the "first of the air" and abolishes the necessity of doors. Cages are self-dumping and are provided with safety catches and overhead covers. Gates are furnished to landings, and all the requirements of the law are fully met. Five grades of coal are made at this mine, viz, lump, egg, nut, pea, and slack. As this mine is free from fire damp no shot firers are employed. Capacity of

mine about 1,000 tons per day, giving employment to about 250 men. David Brown is mine boss. There have been no accidents at this mine during the past year.

LEHIGH MINES Nos. 6 AND 6½.

The above mines are operated together. Owing to a fair demand for this coal, extensions have been considerable in this mine since my last report. All the hoisting is now done from No. 6. Five electric mining machines are now in successful operation. The main entry between mines No. 6 and No. 6½ is now being graded and laid with 25-pound steel rails, it being the intention to use an electric locomotive to haul coal between 6 and 6½, to do the work at present being done by rope haulage. An electric shearing machine is used for "cutting" in the entries. Shaft No. 6 is 240 feet deep and 6½ is 234 feet deep, the two shafts being about 4,000 feet apart and connected by the main north entry. No. 6 shaft is equipped with a pair of first-motion engines with 16 by 30 inch cylinder and 7-foot drum. Steam is supplied by a battery of six boilers for all machinery. Cages are self-dumping and provided with safety catches and overhead cover for protection of men. Power for all electric machines is furnished by a Thompson-Ryan generator, manufactured by J. H. McEwan & Co., of Ridgway, Pa., the generator being type B, 10 poles, 120 kilowatts, running 600 revolutions per minute and capable of developing 200 horsepower, this generator being driven by a Watertown (N. Y.) engine, 15 by 16 inch cylinder, running 250 revolutions per minute and capable of developing 200 horsepower.

The workings of this mine consist of a slope with five lifts and a plane. The plane is equipped with a single large hoisting engine, the plane being operated by gravity. Ventilation is had by a Crawford & McCrimmon fan placed on a ventilating shaft sunk to the rise of the coal and a 13-foot fan placed at the head of No. 6½ shaft. Ventilation in this mine is abundant and has a separate split of air for each entry, no trap doors being required. Escapement is had by No. 6½ shaft, which is provided with a stairway.

This mine produces no fire damp. Its capacity is about 1,000 tons per day, and during the past year has given employment to 223 men. George Cullen is mine boss. There have been two accidents during the past year, one of which proved fatal.

I attach copies of letters from Mr. J. S. Cameron, cashier and assistant superintendent, giving statistics of production and other valuable information.

At the commencement of the strike on March 1, 1899, when difficulty was found in operating shafts by the company, it opened extensive strip pits which have been in operation and have produced large quantities of coal and given employment to a large number of men and teams.

Appended hereto will be found letters fully describing the output and other details of these mines. Also appended hereto will be found a copy of the rules enforced by this company.

January 20, 1899.—J. C. Young (American); top hand; age 52; married. Hand crushed between bumpers of railroad cars, causing loss of three fingers. This man's duty was to run down cars to be loaded and also to drop the loaded cars out of the way. In attempting to make a coupling his hand was caught between the drawbars, making it necessary to amputate three fingers.

May 11, 1899.—Gus Harley (colored); miner; age 49; single. Crushed by premature blast. This man and one Arthur Cummings were working a room together.

They had prepared two shots, one shot going off and catching Harley before he could get out of the way, knocking him down, and flying pieces of coal struck him in the back and head, inflicting wounds from which he died on May 17. Both shots were fired, and all indications are that the shot which caught this man exploded before he could get away because the miner had bit or cut off the fuse too short. The biting off the squib or fuse seems to be a common practice on the part of the miners, the object being to cause the shot to go off with less delay; sometimes, as in this case, causing injury because the time is made too short.

ATOKA COAL AND MINING COMPANY.

LEHIGH, IND. T., *January 12, 1899.*

Statistics for six months ending December 31, 1898.

Mine.	Lump.	Mine run.	Slack, pea, and nut.	Total.	Days worked.	Men employed.
	Tons.	*Tons.*	*Tons.*	*Tons.*		
No. 5	40,166.90	1,362.55	4,009.85	45,539.30	104½	239
No. 6	42,109.00	.....	4,802.35	46,911.35	106½	260
Strip	5,571.60	.....	.....	5,571.60	110	25
Total	87,847.50	1,362.55	8,812.20	98,022.25	320½	524

L. W. BRYAN, Esq.,
United States Mine Inspector, South McAlester, Ind. T.

DEAR SIR: In response to your request of December 31, I submit to you the above table of statistics, which shows at once the operations of this company for the six months ending December 31, 1898.

Since my last report to you we have installed in mine No. 6 one Jeffrey electric shearing machine, which is now in successful operation in this mine. This machine cuts the coal in the center of the entry for a distance of 6 feet, the full depth of the vein, the shear being about 4 inches wide, at one setting.

Preparations are being made to install an electric locomotive in main north entry, which we expect to have in operation inside of ninety days. This locomotive will haul coal from 6½ and will deliver it at mine No. 6 bottom, where it will be hoisted and dumped into cars by our extensive plant which is already installed at this point. The Jeffrey mining machine continues to mine the coal in rooms and entries in mine No. 6, and at present about two-thirds of the coal loaded at this mine is machine coal. Prospects for a good year's work at the Lehigh mines seem favorable, and the indications are that the output for the ensuing year will surpass that of 1898.

Yours, truly,

J. S. CAMERON,
Assistant Superintendent and Cashier.

ATOKA COAL AND MINING COMPANY,
Lehigh, Ind. T., July 11, 1899.

DEAR SIR: The following is a tabulated statement showing the production of coal by this company for the six months ending June 30, 1899:

Source.	Lump.	Nut, pea, and slack.	Total.
	Tons.	*Tons.*	*Tons.*
Mine No. 5	18,117	4,275	22,392
Mine No. 6	28,197	5,893	34,090
Total	46,314	10,168	56,482

Strip (mine run) 28,166

Owing to the strike which has been in progress for the past four months, no improvements have been added to the mines.

Yours, truly,

J. S. CAMERON,
Assistant Superintendent and Cashier.

L. W. BRYAN,
United States Mine Inspector, South McAlester, Ind. T.

Following are the rules in force in the mines operated by the Atoka Coal and Mining Company:

DUTIES OF MINERS.

Rule 1.—The miner shall each day examine his working place before beginning work, and take down all dangerous slate, or otherwise make it safe by properly timbering the same before commencing to dig or load coal, and he shall at all times be very careful to keep his working place in a safe condition during working hours.

Rule 2.—Should he at any time find his place becoming dangerous from any unusual condition that may have arisen, he shall at once cease working and inform the mine boss or his assistant of such danger.

Rule 3.—Every miner shall order props, cap pieces, or other necessary timbers from the driver who brings him his cars. The miner shall always have on hand a sufficient quantity of props, cap pieces, and other necessary timbers, and shall order the same in advance, so that the driver may have time to bring them. Should the miner from any cause have no props or other necessary timbers on hand, he shall immediately cease work, vacate his working place, and report the fact to the mine boss.

Rule 4.—No shot in rooms of full width shall be placed at a greater depth on the solid than the depth of the undermining. In all narrow work, such as entries, room turning, breakthroughs, etc., the coal must be sheared or cut on one side the full thickness of the vein and at least the full depth of the drill hole.

Rule 5.—Any miner who negligently blows out timbers and causes falls at his working face will be required to clear same at his own expense. The company will only assist at such clearing of falls when roof was known to have been bad or there was no negligence shown on the part of the miner.

Rule 6.—Any miner loading "bony" coal or other foreign matter with his coal shall, for the first offense, be suspended one day; for a second offense be suspended one week, and for the third offense shall be discharged.

Rule 7.—Firing of shots shall take place but once daily, and shall commence at 5 p. m., at a signal to be agreed upon by the mine boss and miners. In case of men working but half day, shots may be fired at 12 o'clock noon. Any miner firing before these hours shall be subjected to the same penalties as are specified in rule 6 for loading dirty coal.

Rule 8.—Blasting shall commence at first room on return airway, and shall be in rotation, ending on first room on intake airway, and rooms being turned shall wait until entrymen have fired.

Rule 9.—Miners firing a shot in breakthrough or in rib shall first warn miners working in next room that such shot is to be fired.

DUTIES OF DRIVERS.

Rule 10.—When a driver has occasion to leave his trip, or when his trip for any cause is stopped anywhere except at a regular station, he must see that it is left, when possible, in a safe place, secure from cars or other dangers, or from endangering drivers or trips following; and if the trip is left on a main hauling way, he must go back and notify approaching drivers, if any, of the existing obstructions, that they may be enabled to stop their trips and avoid collisions.

Rule 11.—The driver must take great care in taking his trip down grade to have the sprags so adjusted that he can keep the cars under control, and thus prevent accidents.

Rule 12.—On receiving orders from workmen for props, cap pieces, or other necessary timbers, the driver will bring the same with all possible dispatch; and in case for any reason they can not be obtained, he will report the fact to the workman so ordering and also to the mine boss.

DUTIES OF ROPE RIDERS.

Rule 13.—The position of rope rider being one of peculiar hazard, he must use special care and precaution to avoid the accidents incident thereto.

Rule 14.—He shall exercise great care in seeing that all couplings are safe for use, and see that all trips are properly coupled before starting; and should he at any time see any material defect in the rope, link, hook, or chain, he shall immediately remedy such defect, or, if unable to do so, he shall detain the trip and report the matter to the mine boss.

DUTIES OF CAGERS OR MEN ASSIGNED TO THAT POSITION.

Rule 15.—The cager shall be at his proper place at the bottom of the shaft when men begin to descend in the morning and remain there until the hoisting of coal commences. He shall see that men are safely off the cage and then signal the engi-

neer. He shall be at his proper place at the time the hoisting of coal ceases and men commence to be hoisted in the evening, and shall see that not more than eight persons get on the cage at any one time, and when they are safely on the cage he shall signal the engineer to hoist them. The man acting as cager during the hoisting of coal shall see that all cars are safely held on cage by the catch provided for that purpose before signaling the engineer. He shall not allow any tools or material of any kind to be placed on the same cage with men or boys, nor on the opposite cage when men are being hoisted out of the mine or being lowered into it, except when for the purpose of repairing the shaft or the machinery therein. The men shall place their tools in cars provided for that purpose, which car or cars shall be hoisted or lowered before or after the men have been hoisted or lowered; and he shall immediately inform the mine boss of any violations of this rule. In signaling the engineer the cager will use the signals as directed in general rule No. 30.

DUTIES OF TOPMEN OR MEN ASSIGNED TO THAT POSITION.

Rule 16.—He shall be at his proper place in the morning from the time the persons begin to descend into the mine and shall remain there until the hoisting of coal commences. He shall see that not more than eight persons get on the cage at any one time, and when they are ready he will close the gate and signal the engineer to lower the cage; and he shall not open the gate until cage has been placed in position to receive men. After the hoisting of coal ceases in the evening, it shall be his duty to be at his proper place until all of the men are hoisted out of the mine. He shall see that the men get safely off the cage, and then shall signal the engineer in the proper manner. He shall not allow tools or material of any kind to be placed on the cage with men and boys, nor on the opposite cage when persons are being lowered into the mine, except for the purpose of repairing the shaft or machinery therein. The men shall place their tools in cars provided for that purpose, which car or cars shall be lowered before or after the men have been lowered. In signaling the engineer the topman shall use the signals as directed in general rule No. 30.

DUTIES OF ENGINEERS.

Rule 17.—It shall be the duty of the engineer to keep careful watch over his engine and all machinery under his charge, and see that the same is in proper working order before attempting to raise or lower men or material.

Rule 18.—He shall see that the boilers are cleaned and inspected at proper intervals and that the steam pressure does not exceed at any time the limit allowed by the superintendent.

Rule 19.—He shall not allow any unauthorized person to enter the engine house, neither shall he allow any person to handle or run the engine without the permission of the superintendent.

Rule 20.—When workmen are being raised or lowered he shall take special precautions to keep the engines well under control.

Rule 21.—The engineer will observe and operate his engine in accordance with the general and special rules governing signals. (See general rule No. 30.)

DUTIES OF FIREMEN.

Rule 22.—Every fireman or other person in charge of a boiler or boilers for the generation of steam shall keep a careful watch of the same. He shall see that the steam pressure does not exceed at any time the limit allowed by the superintendent. He shall frequently try the safety valves and shall not increase the weight on the same. He shall maintain a proper depth in each boiler, and if anything should happen to prevent this he shall report the same without delay to the engineer and take such other action as may under the particular circumstances be necessary for the protection of life and the preservation of property.

RULES AND REGULATIONS IN REGARD TO POWDER.

Rule 23.—No powder can shall be opened in any other manner than that provided by the slide or lead plug provided for that purpose. It is strictly forbidden to use a plug of any kind to drive through the end of a powder keg for the purpose of opening the same.

Rule 24.—Powder must be kept in a proper tight-locked box at a sufficient distance from the working face, such distance to be designated by the mine boss.

Rule 25.—Whenever a workman shall open a box containing powder or other high explosives or while in any manner handling the same, he shall first place his lamp not less than 5 feet from such explosives and in such a position that the air current can not convey sparks to it, and he shall not smoke while handling explosives.

GENERAL RULES.

Rule 26.—No person shall be allowed to enter any mine, except employes working in the mine, without permission of the superintendent.

Rule 27.—No person in a state of intoxication shall be allowed to go into or loiter about any mine.

Rule 28.—No person shall be allowed to travel on foot to or from his work on any incline, plane, or slope when other good roads are provided for that purpose. As each mine is provided with a pass way round the shaft at the bottom, all persons employed in the mines or others are strictly forbidden to cross over from one side of the shaft to the other side, through the hoisting compartment, under any circumstances whatever.

Rule 29.—Workmen and all other persons are strictly forbidden to commit any nuisance, or throw into, deposit, or leave coal, dirt, or stones, or other rubbish in the air courses or roads, so as to interfere with, pollute, or hinder the air passing into or out of the mine.

Rule 30.—In all shafts or slopes where persons, coal, or material of any kind are hoisted or lowered by machinery, the following code of signals shall be used:

One signal, to hoist coal or other material.

Two signals, to stop cage or car when in motion.

Three signals, that persons are to be hoisted; on hearing which the engineer will signal back "ready," by giving one signal. On hearing the last-named signal the persons will get on car or cage, and when they are safely on car or cage one signal shall be given the engineer to hoist. After the hoisting of coal has ceased in the evening and the 5-o'clock whistle has blown, it will only be necessary to give the first three signals for the first three cages of men, after which the one signal, "ready," will only be given for each cage until all the men are out.

Four signals, that mules are to be hoisted; on hearing which the engineer will signal back "ready," by giving one signal. On hearing the last-named signal, the mule will be placed on the cage, and when it is safely on the cage one signal shall be given the engineer to hoist.

Five signals, turn steam onto slope or underground engines.

Six signals, shut steam off from slope or underground engines.

Rule 31.—No person or persons shall go into an old or abandoned part of the mine, or into any other place which is not in actual course of working, without the permission of the mine boss, nor shall they travel to or from their work except by the traveling ways provided and assigned for that purpose.

Rule 32.—No persons in the mine shall be allowed to enter into any room or working place except the working place to which his duty calls him. It is strictly forbidden for any person to visit a room, or other working place except his own, either during the presence or absence of the proper occupants. All boys or other persons assigned to special posts, as trappers or otherwise, must remain at their post while on duty.

Rule 33.—All miners must be in the mine before the 7-o'clock whistle blows in the morning. Drivers must have their mules out of the stable and ready for work, and all other company men must be prepared to start work when the whistle blows at 7 o'clock.

Rule 34.—Any person found with tools or powder belonging to another person, without the owner's consent, shall, for the first offense, be fined $2.50, and for the second offense he shall be discharged, such fines to be paid to the owner of the tools or powder and collected at the company's office. Any person detected in exchanging checks on the pit cars shall be immediately discharged.

Rule 35.—Any miner or employee who shall damage any signal bell or wire, brattice, airway, or door, or open a door and not close it again, or do anything by which the safety of the men in the mine may be endangered, shall be promptly discharged.

Rule 36.—Whenever it shall be the duty of any person to go into the "sump," or space below the cage at the bottom of the shaft, for the purpose of cleaning out, removing dirt, or otherwise, they shall first place a prop or props of wood or iron in such a manner as to arrest the cage should it from any cause be made to descend, and thus secure themselves or others from possible danger.

Rule 37.—All employees who desire to absent themselves from work must notify the foreman under whom they work the day before, and any one absent without permission will, for the first offense, be suspended three days, and for the second offense be suspended one week, and for the third offense be discharged, except in case of sickness.

Rule 38.—All persons except those duly authorized are forbidden to meddle or tamper in any way with any electric or signal wire about the mine.

Rule 39.—No miner or other employee shall be entitled to receive his time at the company's office until he shall obtain from the mine boss a clearance card, and in

case of employees renting a company house, a note must be obtained from the superintendent's clerk stating amount of rent due.

Adopted July 24, 1897.

WILLIAM CAMERON, *Superintendent.*

Approved:

R. M. MCDOWELL, *General Manager.*

ATOKA COAL AND MINING COMPANY, LEHIGH, IND. T.

NOTICE.

Miners are responsible for the safe and secure propping of the rooms in which they work, and each must see that his working place is carefully examined and made safe, in order to avoid accidents from falls of slate or coal.

Each employee must make himself thoroughly acquainted with all the rules of this company. He must strictly observe these rules and promptly report to the superintendent any infraction or disregard of the rules that comes to his notice.

Note and observe carefully all the rules and regulations in regard to powder and propping, and otherwise making working places safe.

WILLIAM CAMERON, *Superintendent.*
R. M. MCDOWELL, *General Manager.*

JULY 24, 1897.

SOUTHWESTERN COAL AND IMPROVEMENT COMPANY.

MINE No. 4.

This mine is a shaft mine 274 feet in depth, with a slope driven from near the foot of the shaft, from which slope five lifts are operated; the lower lifts are not now being operated, however, having been temporarily abandoned. At the head of the slope is an engine for the purpose of hoisting coal to the foot of the shaft. A plane is also driven from near the foot of the shaft, which is opened out to the crop of the coal and is now being operated, an engine and boiler being stationed at the mouth, which lowers the coal from these works to the foot of the shaft. The shaft is equipped with direct-acting double engines, 16 by 24 inch cylinders with 8-foot drum. Steam for the operation of this machinery is furnished by a battery of four boilers. Ventilation is had by a 12-foot fan at the air shaft, about 125 feet distant from the main shaft, which fan has a capacity of 35,000 cubic feet of air per minute. Air courses and travel ways are kept in good condition. There are two methods of ingress and egress in addition to the hoisting shaft, one being about 600 feet from the main shaft, provided with suitable stairway, and the other being the plane heretofore referred to.

The capacity of this mine is about 500 tons per day and gives employment to about 200 men. This mine generates a small quantity of fire damp and shot firers are employed. W. S. Miller is mine boss. Considerable trouble has been experienced in this mine by the soft bottoms and leaving the pillars too small, thus causing them to slip and some of the entries to cave in badly. There has been one accident during the past year, which was not fatal.

August 5, 1898.—John Brack (Italian), miner; age, 28; single. Fall of slate, causing bruises about shoulder and side. The injuries were not serious.

COALGATE MINE No. 5.

This mine is at this writing abandoned. The iron and cars have been taken out of the mine and the mine permanently closed. This mine was operated but little more than half the past year and has been a great producer. There have been no accidents to report.

MINE No. 9 (NEW).

There has been no change in this mine since my last report, with the exception that a shaft is now being sunk and the railroad track built to the mine. It is expected that the shaft will be completed this fall and a connection with the slope made, after which time, when the equipment is made complete, it will be a large producer, the slope having been driven in about 1,600 feet.

Letters from Mr. D. C. Welch, the auditor of the company, are appended, which give details of the output and other matters in connection with this mine.

SOUTHWESTERN COAL AND IMPROVEMENT CO.,
Parsons, Kans., January 17, 1899.

DEAR SIR: Per your favor of December 31, addressed to Superintendent Fleming, I beg to submit the following:

Total output six months ending December 31	tons	136,529.60
Number days worked		141
Number of men employed		500

Yours truly,

D. C. WELCH.

Mr. L. W. BRYAN,
United States Mine Inspector, South McAlester, Ind. T.

SOUTHWESTERN COAL AND IMPROVEMENT CO.,
Parsons, Kans., July 18, 1899.

DEAR SIR: Replying to your favor of recent date, the following is a statement of the output of our Coalgate mines for the six months ending June 30, 1899:

	Tons.
Screened	29,192.45
Mine run	5,521.60
Slack	6,275.25

Yours truly,

D. C. WELCH.

Mr. L. W. BRYAN,
United States Mine Inspector, South McAlester, Ind. T.

THE FOLSOM COAL AND MINING COMPANY.

This company, owned by J. B. McDougall, operates a slope mine in the western part of Coalgate. The mine is driven in four lifts, the coal being about 4½ feet in thickness and having a pitch of about 6 degrees. The equipment consists of a single hoisting engine and one boiler, a tipple being erected at the mouth of the mine, and a switch has been built from the Missouri, Kansas and Texas Railway. The mine is ventilated by furnace and air shaft. Escapement is had by means of a hole sunk to the coal and equipped with a good ladder. Ventilation is fairly good and the mine is in a reasonably good condition. This mine is now operated by James Ferrimond, under lease from Mr. J. B. McDougall. Letters are appended hereto giving output and other information. Output for the past year has been 15,786 tons. One accident occurred at this mine, which proved fatal.

October 14, 1898.—Simon Vegi (Italian), miner; age, 32; married. Struck by pit car and instantly killed. This man was operating this mine under contract. He had mounted a trip of cars at one of the lower lifts in the mine, intending to ride to a manhole that had been cut in the side of the slope for the purpose of allowing an escape from trips coming up or down the slope. His intention was to jump into this manhole as the trip on which he was riding passed, as the men had made a frequent practice of doing, and then cross the slope to other parts of the mine. He miscalculated either the speed at which the trip was running or the exact location

of the manhole and jumped too late, striking the corner of the manhole and being thrown down by the track. The first car, the one on which he had been riding, was thrown from the track, but the others remained and he was rolled and crushed between the cars and the slope wall, a distance of only about 8 inches. The engineer realized that something was wrong and immediately stopped his engine, but the trip of cars had already passed and the body lay behind crushed and with no signs of life. This was a very distressing accident, but one for which no one but the injured man himself could be blamed, as he was in full charge of the mine and the rules were very rigid prohibiting persons from riding on the loaded trips.

COALGATE, IND. T., *July 3, 1899.*

MY DEAR SIR: Pursuant to your request, herewith find statement of workings of McDougall mine. Regarding the new mine near Lehigh, nothing whatever has been done toward laying track or opening up of mining property. If I can serve you at any time, call upon me; am always at your service.

Yours, S. P. ANCHOR.

Hon. L. W. BRYAN,
South McAlester, Ind. T.

COALGATE, IND. T., *July 3, 1899.*

DEAR SIR: Below find statement of output coal for six months ending December 31, 1898, as reported to the coal trustees:

	Tons.
July	318
August	83.90
September	361.25
October	1,608
November	4,222.40
December	3,033.15
Total	9,626.70
Average number men each month	65
Total days worked	120
Total kegs powder for six months	660

Yours, truly,

J. B. MCDOUGALL.

L. W. BRYAN, Esq.,
South McAlester, Ind. T.

COALGATE, IND. T., *July 24, 1899.*

L. W. BRYAN, Esq.,
South McAlester, Ind. T.

DEAR SIR: In reply to yours we will give you statement of coal output for six months ending June 30, 1899:

Screened deep mine:	Tons.
January	2,427.10
February	2,729.75
Screened strip:	
April	113.85
June	289.90
Total	5,560.60
Average price per ton received	$1.40
Average price per ton paid	.75
Average powder sold per month ..... kegs..	120
Average number days per month, January and February	22
Average number men employed	75

March, April, May, and June mine shut down on account strike.

J. B. MCDOUGALL.

PERRY BROTHERS.

This firm owns and operates a mine on a branch line that has been built on the Missouri, Kansas and Texas Railway about 2 miles distant from Coalgate. This is a slope mine and has been driven in four lifts; it is equipped with a pair of double hoisting engine's and one boiler, and is ventilated by an air shaft and furnace, and has been operated but little during the past year. Output, 3,834 tons. No accidents to report. The coal in this mine has a dip of about 10° and is about 4 feet in thickness.

Below will be found a statement of the total amount of coal shipped from the mines located on the Missouri, Kansas and Texas Railway in the Indian Territory:

Total output of coal and number of men employed in mines on the Missouri, Kansas and Texas Railway in the Indian Territory for the year ended June 30, 1899.

Station.	Operator.	Men employed.	Tons shipped.
Carbon	Kansas and Texas Coal Co	420	140,235
Krebs	Osage Coal and Mining Co	564	228,976
McAlester	Noah Samples	65	24,350
Do	D. Edwards & Son	20	7,531
Fairview	do	10	1,192
Savanna	Hailey & Co	6	216
Do	M. Perona	4	100
Do	Johnsville mines	12	300
Lehigh	Atoka Coal and Mining Co	524	182,670
Coalgate	Southwestern Coal and Improvement Co	500	177,519
Do	J. B. McDougall	75	15,186
Do	Perry Bros	15	3,834
Total		2,215	782,109

Total output of coke shipped on Missouri, Kansas and Texas Railway in the Indian Territory for the year ended June 30, 1899.

Station.	Shipper.	Number tons.
Krebs	Osage Coal and Mining Co	16,136

Following is a description of operations on and adjacent to the St. Louis and San Francisco Railway in the Indian Territory for the year ended June 30, 1899:

At a point about 3 miles south of Jenson the Kansas and Texas Coal Company has opened a strip pit and built a switch from the St. Louis and San Francisco Railway in a westerly direction and for a distance of about 1 mile, from which point they have been shipping coal. They started this strip pit opening as soon as the strike was inaugurated. At this point also they are sinking a slope, and the probabilities are that they will put in a permanent mine at this point. There are no accidents to report. The output for the past year has been 9,685 tons. The coal at this point has a dip of about 10° and is from 3 to 4 feet in thickness.

On the Cavanal Mountain, about 3 miles distant from Poteau on the St. Louis and San Francisco Railway, there is a mine formerly operated by the Cavanal Coal and Railway Company, which built a line of railroad 3 miles in length running from the main line of the St. Louis and San Francisco Railway to its mine. Becoming financially embarrassed, the concern changed hands and was reorganized as the

Indianola Coal and Railway Company, which operated the mine for several months. During this time they had two very serious explosions, in both of which death occurred, the shot firers being killed. This mine generates some fire damp, but not enough to be troublesome to handle, as the quantity is small. The coal at this point is located about 300 feet above the main line of the St. Louis and San Francisco Railway, and is 4 feet in thickness, dipping toward the center of the mountain about 10°, and is very dry and dusty. The mine was equipped with two large fans for ventilation, one on each side of the slope, on air courses that were driven parallel with the slope. Each fan furnished about 35,000 cubic feet of air per minute. Two most serious explosions occurred in this mine, one on November 14 and the other on December 12, 1898. These two explosions both occurred in the same way and from the same cause, viz, an imperfectly prepared shot, and the intensity of same increased by reason of the fans running at a high rate of speed and carrying into the mine large volumes of cold air, desiccating the dust of all its moisture and causing the existence of a condition which past experience has proven to be that condition which renders this dust inflammable and explosive. The conditions favorable and necessary to such explosions are, first, absolute purity; second, fineness; third, dryness; the prime or initiatory cause of such explosions being usually a badly prepared, "windy," or blown-out shot. Had the large fans been slacked in speed at the time the shot firing was done, and run at a lower rate of velocity, the chances are that the explosions would have been diminished in effect or rendered entirely harmless.

The first explosion occurred on November 14, by which only one man lost his life, but it was the most violent and severe explosion I have even seen. The explosion started in the third lift, and its violence was the greatest at the first lift or culminating point of the explosion. As the force of this explosion sought an escapement from the mouth of the slope it tore out the slope timbers, caving in the coal and tearing out the mouth of the mine to such an extent as to almost obliterate all trace of a mine opening, destroying the engine house and blowing away the connection to the hoisting engine. This mine was then cleaned out and was again in shape to operate by about the 10th or 11th of December, and worked just two days when another and similar explosion occurred, being almost as severe as the first one, again wrecking the mine and blowing a trip of cars that stood near the knuckle over against the engine building, and the engine house and steam connections were again wrecked. The conditions under which both these explosions occurred were very much the same; in the first explosion but one life was lost, and in the second two lives were lost, as there were two shot firers on duty. This mine was again idle for about three months. When the strike occurred the company acceded to the demands of the strikers, but only worked a few days until there were further disagreements and the mine has since been idle. The equipment of this mine consists of a pair of Ledgerwood hoisting engines, by which the coal is hauled from the slope to the mouth of the mine, at which place this same engine drops it down a plane 300 feet in length to the tipple on their line, and is thence hauled by their own engine to the Frisco Railway. The output for the past year has been 6,000 tons. There have been three accidents, heretofore mentioned, further details of which are given below:

November 14, 1898.—David James (American); shot firer; age 45; married; dust explosion. This man's duty was to enter the mine and fire shots after all other miners had gone home. In this case he had fired a shot in the third west entry,

which, while seemingly well prepared, proved to be a "windy," blowing out the tamping and causing concussion and flame enough to stir up and light the coal dust. The explosion killed this man instantly and traveled through the mine, gathering strength constantly until it found relief at the mouth of the mine. This was a most terrific explosion, and had it not been for the system of shot firing, by which the mine is emptied of men at the time, the loss of life would have been terrible, as not a living thing in the mine could have escaped destruction.

December 12, 1898.—Barney Lovell and Matt Thompson (Corsican); shot firers; aged 25 and 26 years respectively; both single. This was another most violent explosion, causing the death of the two men above named. These men were shot firers, and it was their duty to enter the mine after all others were out and prepare and fire the shots, so that in case of a "windy" or blown-out shot only the men engaged in lighting the shots would be liable to injury. It was in this same mine that David James lost his life by a similar explosion on November 14 last, and the mine had just been cleaned out and timbered up when this explosion occurred, starting from the same entry and resulting from the same character of shots, wrecking the mine fearfully a second time. The explosion was solely a dust explosion, as there was no gas present in the mine at the time. The mine owners had taken the precaution to sprinkle the entries and exercised greatest care and caution since the former explosion, but notwithstanding all precautions this explosion resulted, of about same character and effect as previous one, and caused the death of these two men, besides a great destruction of property.

At Cavanal the Crescent Coal and Mining Company has commenced a new operation, the details of which will be found in the appended letter from Mr. Martine Theurer, the treasurer of the company. No output so far and no accidents to report.

FORT SMITH, ARK., *July 13, 1899.*

DEAR SIR: Yours received. The Crescent Coal Company is located at Cavanal, with general office in Fort Smith. Capital stock, $100,000. A. L. A. Thomas, president; J. A. Hughes, secretary; Martine Theurer, treasurer.

We have built and bought 14 houses; are laying our switch now; have 60-horsepower boiler set, purchased 40-horsepower engine, and building tipple, with shaker screen now. We are not mining anything, but have on day and night shift driving slope and entries. We are in now about 500 feet, have two new entries, one east about 80 feet and one west about 65, besides our old workings, which do not amount to much. We will turn another entry August 1 and another August 15, and by October 1 expect to have 6 new entries. Our coal is of fine quality. We have air shaft, and will place a 10 or 12-foot fan. When finished we will have a fine plant. Any other information will be gladly furnished.

Yours,

MARTINE THEURER.

L. W. BRYAN, Esq.,
South McAlester, Ind. T.

At Bryan and Braidwood the Kansas and Texas Coal Company have plants, but operations have been suspended during the past year.

Near Antlers, Ind. T., the thick vein of coal heretofore alluded to in my previous reports has been attempted to be utilized during the past year. Owing to the friable nature of the material it can not be transported as coal, but I learn that several carloads have been shipped to be reduced to and used as asphalt. The commercial value of this substance is at present purely speculative.

Total output of coal and number of men employed in mines on the St. Louis and San Francisco Railway, in the Indian Territory, for the year ended June 30, 1899.

Station.	Shipper.	Number of men.	Tons.
Jenson	Kansas and Texas Coal Co	51	9,685
Potean	Indianola Coal and Railway Co	80	6,000
Cavanal	Crescent Coal Co. (new concern)	.....	.....
Bryan	Kansas and Texas Coal Co	.....	.....
Braidwood	....do	.....	.....
Antlers	Dr. Nash	.....	.....
Total	.....	131	15,685

Following is an account of operations on or adjacent to the Kansas City, Pittsburg and Gulf Railway, in the Indian Territory, for the year ended June 30, 1899:

PANAMA.

On the Kansas City, Pittsburg and Gulf Railroad, 7 miles north of the station of Poteau, the Ozark Coal and Railway Company has constructed its own railroad and opened a mine at the terminus. The coal at this point is 3½ feet in thickness and has a pitch of about 14 degrees to the south. This is a slope mine and is now driven in three lifts, is equipped with a 10-foot fan and a double pair of 10 by 16 engines, railroad scales, blacksmith shop, about 20 houses, boarding house, and store. This coal is very high in fixed carbon, the analysis showing 77 per cent, and is very similar to the coals of Arkansas. It is the purpose of this company to extend this line a few miles farther west and materially increase their output. The output for the past year is 7,377 tons. There have been no accidents to report.

CHOCTAW COAL AND MINING COMPANY.

This company has commenced the construction of a railroad track from the main line of the Kansas City, Pittsburg and Gulf Railroad at Shady Point to a point 6 miles distant to the west, at which point they have also commenced opening a mine, the coal at this point being about 4½ feet in thickness, with two strata of slate of about 4 inches between the layers of coal. This concern will probably be in operation in time for this winter's business, as they seem to be pushing their work.

CHOCTAW COAL AND MINING COMPANY,
Kansas City, Mo., July 7, 1899.

DEAR SIR: Replying to your favor of July 1, I will say our company is now opening up a large mine 8 miles southwest of Shady Point and equipping the same with latest improved machinery and electric plant. Capacity of mine, 1,500 tons per day. We expect to put up three plants on our 7,000 acre tract, all of which will be equipped as above.

We are also building a railroad from Shady Point to the coal land, a distance of 8 miles, which line we expect to extend in the future. We expect to have our plant in full operation and railroad completed by October 1.

Yours, respectfully,
L. W. BRYAN,
U. S. Mine Inspector, So. McAlester, Ind. T.

CHOCTAW COAL AND MINING CO.,
By W. H. CAFFERY, *General Manager.*

At Heavener, about 2 miles distant from the main line, Milby & Dow are opening a slope in the same coal and on the same vein with the Mexican Gulf Coal and Transportation Company. This work has not progressed yet to any extent.

Total output of coal and number of men employed in mines on the Kansas City, Pittsburg and Gulf Railway in the Indian Territory for the year ended June 30, 1899.

Station.	Shipper.	Number of men.	Tons.
Hobart (Panama)	Ozark Coal and Railway Co.	100	7,377
Shady Point	Choctaw Coal and Mining Co.[1]		
Heavener	Milby & Dow Coal Co.[1]		
Total		100	7,377

[1] New concern.

There have been some small strip pits and small mines opened in the Creek and Cherokee nations in the vicinity of Wagoner, Muscogee, Claremore, Chelsea, Tulsa, and Sapulpa. The vein of coal running through that section of the country is thin, being at the best 20 to 30 inches in thickness, averaging possibly 24 inches. The coal lies near the top of the ground and there are no mines of any consequence. Some considerable coal has been mined in the neighborhood of Chelsea and shipped over the St. Louis and San Francisco Railway. I have not been able to get a statement of the output, but think it to be in the neighborhood of 5,000 tons for the year.

At Krebs the Osage Coal and Mining Company is operating 75 coke ovens, which are also furnished with a slack washer and other necessary machinery. The total output of coke from this concern during the past year has been 16,126 tons. Account of this will also be found included in the total shipments on the Missouri, Kansas and Texas Railway.

Résumé of shipments of coal and number of men employed in the Indian Territory, by railroads, for the year ended June 30, 1899.

	Men employed.	Tons shipped.
Choctaw, Oklahoma and Gulf R. R	1,559	599,271
Missouri, Kansas and Texas Rwy	2,215	782,109
St. Louis and San Francisco Rwy	131	15,685
Kansas City, Pittsburg and Gulf Rwy	100	7,377
Total	4,005	1,404,442
Shipments of coke.		
Choctaw, Oklahoma and Gulf R. R	.....	13,226
Missouri, Kansas and Texas Rwy	.....	16,136
Total coke	.....	29,362
Grand total shipments coal and coke	.....	1,433,804

Total output and number of men employed in Indian Territory, by years.

Year ended June 30—	Men employed.	Tons shipped.
1894	3,265	966,315
1895	3,648	1,228,440
1896	3,695	1,285,333
1897	3,470	1,343,376
1898	3,529	1,458,098
1899	[1] 4,005	1,433,804

[1] The increased number of men in proportion to the output over that of 1898 is accounted for, first, by the strike which caused the importation of large numbers of new men, and also by the fact that a number of new operations have been commenced and extensions of previous operations made, on account of which a proportion of the men have only worked during a part of the year and without a corresponding increase in the output.

Output of coal in the Indian Territory for the years ended June 30, 1898 and 1899, by companies.

Operator.	1898.	1899.
	Tons.	*Tons.*
Choctaw, Oklahoma and Gulf R. R. (including tonnage of Kali-Inla Coal Co. for 1899)	460,161	409,756
Osage Coal and Mining Co	163,028	228,976
Atoka Coal and Mining Co	193,201	182,670
Southwestern Coal and Improvement Co	352,613	177,519
Kansas and Texas Coal Co	143,778	149,920
McAlester Coal and Mineral Co	16,170	48,062
Wilburton Coal and Mining Co	5,575	48,561
Ola Coal and Mining Co	8,740	36,880
Milby & Dow Coal Co	19,800	41,114

Output of coal in the Indian Territory for the years ended June 30, 1898 and 1899, by companies—Continued.

Operator.	1898.	1899.
	Tons.	*Tons.*
Noah Samples	6,000	24,350
J. B. McDougall	1,452	15,186
D. Edwards & Son	2,333	8,722
Perry Bros.	2,631	3,834
Hailey Coal and Mining Co	.....	4,975
Mexican Gulf Coal and Transportation Co	.....	6,253
Indianola Coal and Railway Co.[1]	.....	6,000
Cavanal Coal, Coke, and Railway Co.[1]	19,605	.....
Ozark Coal and Railway Co	.....	7,377
Sundry small mines	.....	4,286
Sundry operations discontinued	63,011	.....
Total	1,458,098	1,404,442

[1] Same property.

It will be noted that the output of the larger companies remained about the same with two exceptions, the Osage Coal and Mining Company having materially increased their output. This is accounted for by the fact that a large body of the miners at Krebs refused to join the strikers and remained steadily at work, while the demand for coal remaining good on account of the strike in other localities kept these mines running steadily during the summer months. As this company relies entirely on the demand outside the Territory, their mines are usually idle during a portion of the time in summer.

The large decrease in the output of the Southwestern Coal and Improvement Company is accounted for by the fact that at the time of the commencement of the strike some of their mines were worked out and they were deterred from proceeding with contemplated new operations.

Following is a complete list of the various individuals, firms, and companies operating in coal in the Indian Territory, with names and addresses of officials:

Name, etc.	Office.	Address.
Choctaw, Oklahoma and Gulf Railroad Co., Mining Department:		
Francis I. Gowen	President	Philadelphia, Pa.
Henry Wood	General manager	South McAlester, Ind. T.
Edwin Ludlow	Superintendent of mines	Hartshorne, Ind. T.
Osage Coal and Mining Co.:		
Edwin Gould	President	New York, N. Y.
R. M. McDowell	Vice-president and general manager	St. Louis, Mo.
A. M. Fellows	General sales agent	Do.
Wm. Cameron	Superintendent	Krebs, Ind. T.
T. W. Clelland	Cashier	Do.
Atoka Coal and Mining Co.:		
Edwin Gould	President	Philadelphia, Pa.
R. M. McDowell	Vice-president and general manager	St. Louis, Mo.
A. M. Fellows	General sales agent	Do.
Wm. Cameron	Superintendent	Krebs, Ind. T.
Jno. Cameron	Assistant superintendent and cashier	Lehigh, Ind. T.
Southwestern Coal and Improvement Co.:		
A. A. Allen	General manager	St. Louis, Mo.
I. M. Fleming	Superintendent	Parsons, Kans.
D. C. Welch	Auditor	Do.
R. P. Roach	Cashier	Do.
Jno. Russell	Mine superintendent	Coalgate, Ind. T.
Kansas and Texas Coal Co.:		
B. F. Hobart	President	St. Louis, Mo.
W. P. Heath	Secretary	Do.
F. E. Doubleday	General manager	Pittsburg, Kans.
Henry Wilson	Superintendent	Carbon, Ind. T.
McAlester Coal and Mineral Co.:		
Jas. Degnan	President and treasurer	Wilburton, Ind. T.
Jas. McConnell	Secretary and general manager	Do.

Name, etc.	Office.	Address.
Wilburton Coal and Mining Co.:		
Wm. Busby	President	Parsons, Kans.
Jas. Elliott	Secretary and treasurer	Krebs, Ind. T
M. J. Smith	Superintendent	Wilburton, Ind. T.
Ola Coal and Mining Co.:		
O. E. Woods	General manager	Do.
Milby & Dow Coal Co.:		
Andrew Dow	President and general manager	Houston, Tex.
C. H. Milby	Secretary and treasurer	Do.
Samples & Co.:		
Wm. Busby		Parsons, Kans.
Noah Samples		McAlester, Ind. T.
D. Edwards & Son:		
D. Edwards		Do.
Thos. D. Edwards		Do.
Perry Brothers		Coalgate, Ind. T.
Hailey Coal and Mining Co.:		
D. M. Hailey	Owner	Krebs, Ind. T
Mexican Gulf Coal and Transportation Co.:		
G. T. Potter	President	Mexico City, Mexico.
R. O. Babbitt	Vice-president and treasurer	Jersey City, N. J
W. G. Clapp	Secretary	Do.
Jno. Needham	Superintendent	Howe, Ind. T.
Indianola Coal and Railway Co.:		
Emmett A. Ellis	President	Dallas, Tex.
Ozark Coal and Railway Co.:		
B. F. Hobart, jr	President	St. Louis, Mo.
St. Louis-Galveston Coal and Mining Co.:		
Frank L. Grierson	President	Do.
B. E. Black	Secretary	Do.
T. L. Adams	Treasurer	Atoka, Ind. T.
J. Q. Adams	Superintendent	Do.
Eastern Coal and Mining Co.:		
James Degnan	President	Wilburton, Ind. T.
Jas. McConnell	Superintendent and treasurer	
Chas. Hurst		Springfield, Ill.

Résumé and comparative statement of accidents for the years ended June 30, 1894, 1895, 1896, 1897, 1898, and 1899.

CAUSES OF ACCIDENTS.

	Year ending June 30—						
	1894.	1895.	1896.	1897.	1898.	1899.	Total.
Fall of roof	13	13	7	14	9	14	70
Fall of coal	6	5	4	3	6	2	26
Explosion:							
Fire damp	3	11	22	9	14	10	69
Powder	3	1				3	7
Dynamite	1		1				2
From "windy" shot					4	3	7
Boiler					1		1
Blast:							
Premature			2	1	2	4	9
Returning to shot	1	2	2		2	3	10
Drilling old shot	2						2
Caught by flying shot				1			1
Burned by blown-out shot						2	2
Pit car:							
Run over or caught by	7	13	10	11	8	9	58
Falling down shaft of		1					1
Cage, struck or caught by			2	4	1		7
Hoisting machinery, accident to	6		3	1		1	11
Railroad car door falling	1						1
Fall of cross bar			1				1
Fall of dirt in strip pit			1				1
Falling on rail			1				1
Falling off pit top			1				1
Falling down slope			1				1
Kicked by mule				2	1		3
Suffocated:							
By powder smoke					1		1
By smoke from fire					2		2
Electrocuted by cable						1	1
Railroad car, caught while coupling						1	1
Total	43	46	58	46	51	53	297

Résumé and comparative statement of accidents for the years ended June 30, 1894, 1895, 1896, 1897, 1898, and 1899—Continued.

ACCIDENTS, BY COMPANIES.

	Year ending June 30—						
	1894.	1895.	1896.	1897.	1898.	1899.	Total.
Choctaw, Oklahoma and Gulf Railroad Co..	23	27	22	20	26	22	140
Osage Coal and Mining Co	12	12	8	1	1	6	40
Atoka Coal and Mining Co	3	3	7	7	5	2	27
Southwestern Coal and Improvement Co..	5	3	7	5	5	1	26
Kansas and Texas Coal Co	.....	1	6	6	10	4	27
Kiowa Coal and Mining Co	.....	.....	2	.....	.....	.....	2
McAlester Coal and Coke Co	.....	.....	2	3	.....	.....	5
Savanna Coal Mining and Trading Co	.....	.....	1	1	.....	.....	2
Choctaw Coal and Mining Co	.....	.....	1	.....	.....	.....	1
Choctaw Coal and Coke Co	.....	.....	1	.....	.....	.....	1
Cavanal Coal, Coke and Railway Co	.....	.....	.....	1	.....	.....	1
Edwards & Son	.....	.....	.....	1	1	.....	2
McAlester Coal and Mineral Co	.....	.....	.....	1	.....	1	2
Jenson Coal Co	.....	.....	1	.....	.....	.....	1
Ola Coal and Mining Co	.....	.....	.....	.....	2	4	6
Milby and Dow Coal Co	.....	.....	.....	.....	1	2	3
Kali-Inla Coal Co	.....	.....	.....	.....	.....	4	4
Wilburton Coal and Mining Co	.....	.....	.....	.....	.....	2	2
Clelland & Scrimgeour	.....	.....	.....	1	.....	1	2
J. B. McDougall	.....	.....	.....	.....	.....	1	1
Indianola Coal and Railway Co	.....	.....	.....	.....	.....	3	3
Total	43	46	58	46	51	53	297

FATAL ACCIDENTS, BY CAUSES.

Fall of roof	5	1	.....	9	1	5	21
Fall of coal	1	.....	2	2	1	.....	6
Explosion:							
Fire damp	2	1	6	5	3	5	22
Powder	3	.....	.....	.....	.....	2	5
Dynamite	1	.....	.....	.....	.....	.....	1
From "windy" shot	.....	.....	.....	.....	2	3	5
Boiler	.....	.....	.....	.....	1	.....	1
Blast:							
Premature	.....	.....	.....	.....	2	2	4
Returning to shot	.....	2	1	.....	1	3	7
Caught by flying shot	.....	.....	.....	1	.....	.....	1
Pit car, run over or caught by	1	2	3	2	2	4	14
Cage, struck or caught by	.....	.....	.....	1	1	.....	2
Falling down slope	.....	.....	.....	1	.....	.....	1
Kicked by mule	.....	.....	.....	1	.....	.....	1
Suffocated:							
By powder smoke	.....	.....	.....	.....	1	.....	1
By smoke from fire	.....	.....	.....	.....	2	.....	2
Electrocuted by cable	.....	.....	.....	.....	.....	1	1
Total	13	6	12	22	17	25	95

FATAL ACCIDENTS, BY COMPANIES.

Choctaw, Oklahoma and Gulf Railroad Co..	8	4	7	14	10	8	51
Osage Coal and Mining Co	2	1	.....	1	.....	2	6
Atoka Coal and Mining Co	2	.....	.....	2	.....	1	5
Southwestern Coal and Improvement Co...	1	1	2	1	4	.....	9
Kansas and Texas Coal Co	.....	.....	.....	3	1	1	5
Kiowa Coal and Mining Co	.....	.....	1	.....	.....	.....	1
McAlester Coal and Coke Co	.....	.....	1	.....	.....	.....	1
Choctaw Coal and Mining Co	.....	.....	1	.....	.....	.....	1
Edwards & Son	.....	.....	.....	.....	1	.....	1
McAlester Coal and Mineral Co	.....	.....	.....	1	.....	1	2
Ola Coal and Mining Co	.....	.....	.....	.....	.....	2	2
Milby & Dow Coal Co	.....	.....	.....	.....	1	1	2
Kali-Inla Coal Co	.....	.....	.....	.....	.....	2	2
Wilburton Coal and Mining Co	.....	.....	.....	.....	.....	2	2
Clelland & Scrimgeour	.....	.....	.....	.....	.....	1	1
J. B. McDougall	.....	.....	.....	.....	.....	1	1
Indianola Coal and Railway Co	.....	.....	.....	.....	.....	3	3
Total	13	6	12	22	17	25	95

The current year has been rife with strikes and rumors of strikes in all branches of labor, and the business of mining in the Indian Territory has been no exception. The first symptoms of a strike appeared in the fall of 1898, when the men at some of the coal mines demanded that their coal should be weighed in the pit car instead of in the railroad car, as had been the custom. This demand was acceded to by some of the operators, and the rest of the operators afterwards yielded, and this method of weighing is now the universal custom in the Indian Territory, excepting at Lehigh and Coalgate where the slack is worthless. Shortly after this method of weighing was adopted a demand was made for an advance in drivers' wages and the reinstatement of certain men who had been discharged. This demand also was granted. About a week after the last-named occurrence the miners at Cherryvale, Ind. T., in the employ of the Kansas and Texas Coal Company struck because there were six men in the company's employ who did not belong to the Mine Worker's Union. This matter was settled by the six men joining the union. At this time the operators began to fear that it was the intention of the labor organizations to constantly increase their demands until it became impossible to grant them and to an extent which would result in the operators losing control of their mines. The next symptoms of a strike occurred in the mines of the Choctaw, Oklakoma and Gulf Railroad Company, which was met by the action of Mr. Edwin Ludlow, the superintendent, in discharging a number of men who belonged to the Mine Worker's Union, and whom he had charged as being active in fomenting discord among the workmen. This resulted in a strike at the last-named mines, and the company then commenced the importation of white men and a great many negroes to replace the striking miners, and during the month of April, 1899, and to this writing the mines of the above company have been running nearly full time, and their shipments have equaled or exceeded those of any corresponding months in previous years.

The Choctaw, Oklahoma and Gulf Railroad officials took the position that they would meet at any time with their own men who remained in their employ, but would not meet with strangers from other localities who had come to the Territory for the express purpose of causing discord between employers and employed. On February 13, 1899, an interview was had by Mr. James Boston and Mr. Struble, representing the United Mine Workers of America, and Mr. Henry Wood, the general manager of the Choctaw, Oklahoma and Gulf Railroad Company, at which meeting Mr. Wood took the ground that the strike was without cause and unjustifiable, while Mr. Boston claimed that the discharge of union men was a grievance and should be redressed. Mr. Wood refused to negotiate with them, but professed a willingness to meet the employees of the company. No satisfactory results were achieved by this interview.

In the month of February, 1899, the United Mine Workers of Arkansas and the Indian Territory held meetings at Fort Smith, Ark., and invited the mine operators to be present, but as the United Mine Workers had already promulgated an agreement which contained terms claimed by the operators to be impossible of execution no joint meeting was had. Following is a copy of the agreement, acceptance of which was demanded by the United Mine Workers.

Articles of agreement made and entered into this —— day of ——, 1899, between the United Mine Workers of America, District 21, and the operators in the above-named district.

SCALE.

1. All coal shall be weighed before being screened, and 2,000 pounds shall constitute a ton.
2. There shall be run of mine at 60 cents per ton for the Indian Territory and 56 cents per ton, run of mine, for Arkansas, except the Russellville district, which shall be 87½ cents per ton, run of mine; and for the Spadra district 60 cents per ton, run of mine, 2,000 pounds to be a ton. And we further request that the maximum distance for pushing cars at Russellville, Denning, Spadra, Oweta, and Coal Hill shall be 50 yards.
3. That the question of yardage and dead work be left to individual locals for settlement by agreement or arbitration.
4. That the relative difference between pick miners and machine men remain the same, except that the loaders shall receive 30 cents per ton, run of mine.
5. Miners and mine laborers shall be paid every two weeks.
6. There shall be an uniform price of $1.75 per keg for powder.
7. Also an uniform price for drivers of $2.25 per shift.
8. Also an uniform price for trappers of $1 per shift.
9. Further that timbermen, track layers, cagers, rope riders, and slope switchmen shall receive not less than $2.25 per shift.
10. When the driver receives a car of coal, and after it leaves the miners' room, it is in charge of the company and the company shall be responsible for it, therefore the average be paid for broken cars, and further the company shall keep all cars in good shape with full doors and ends.
11. Shot firers shall receive not less than $2.75 per shift.
12. The operators of this district of Arkansas and the Indian Territory shall not discriminate against the United Mine Workers of America.
13. The operators of this district shall grant the check-off system.
14. Dumpers shall receive not less than $1.80 per shift, and car trimmers and other top hands shall receive not less than $1.50 per shift.

This scale shall be in operation from the 1st day of March, 1899, to the 31st day of August, 1899.

We, the parties of the second part, composed of the mine operators known as the —— ——, do hereby agree with the parties of the first part, composed of the United Mine Workers of America of District 21, comprising Arkansas and the Indian Territory, to pay the prices and comply with the conditions named in the above scale formulated by the parties of the first part.

ALBERT STRUBB, *President.*
S. F. BRACKNERS, *Secretary.*
J. C. BRITTON,
JAMES ROWE,
S. F. JOHNSON,
Executive Board.

On the part of the operators it is claimed that most of the demands for advanced wages were out of proportion to the amount paid for mining in other localities, and they also claim that individually the miners of the Indian Territory have expressed themselves as satisfied with the existing conditions, and have only quit work at the direction and command of the organization to which they belong. The features of the proposed agreement, however, to which the operators most strongly object are those which endeavor to place the control of certain questions in the hands of this particular organization, and especially the thirteenth clause or section, which demands the check-off system. This, the operators say, would simply make the operators the agents and collectors for the Mine Worker's Union and for ceall men in their employ to join this particular society. The operators further claim that the clause in the proposed agreement to the effect that the proposed scale should be in operation until August 31, 1899, was an indication that they might then expect further demands.

Therefore the operators, with few exceptions, declined to meet with the United Mine Workers or recognize them in any manner. Major McDowell, general manager of the Atoka Coal and Mining Company, replied to the demands of the United Mine Workers in a letter to Mr.

William Cameron, superintendent, which letter Mr. Cameron printed and circulated among the employees. It is as follows:

To the Employees of the Atoka Coal and Mining Company, Lehigh, Ind. T.:

I am just in receipt of the following letter from General Manager R. M. McDowell, to which I invite your attention:

ST. LOUIS, MO., *February 27, 1899.*

WM. CAMERON, Esq., *Superintendent, Krebs, Ind. T.*

DEAR SIR: I acknowledge your letter of the 24th instant, inclosing a copy of scale formulated by the United Mine Workers of America at their convention in Fort Smith, Ark., on the 22d instant, and have just wired you that my reply would be sent to-day, in order that you might explain to the committee should they call upon you.

I inclose you copy of address to our miners in Arkansas. This reply could be made to our Indian Territory miners, with the exception of the time in which rate of wages were changed five years ago to meet the conditions and make the said wages on a parity or equal to those paid in Arkansas.

We now have the promise of a great improvement of work over former years in your camps in the Indian Territory, having worked up, at a good deal of expense, patronage in old Mexico and in Texas based upon the present prices. These contracts will not admit of any increase in wages, and if they are lost the supply will drift back into the old channels of West Virginia, Alabama, and elsewhere and largely increase the Texas product.

Only a train of evils can follow the inauguration of a strike, aimed at by agitators from different States, and we would ask that our men keep at work and earn good wages, thus preventing the loss of the gain that is now promised by contracts and sale of coal, which can be taken out with a good deal of regularity during the hot weather of summer. Even a short period of idleness will cause these orders to be placed elsewhere by our patrons, and even thus far the current report that there would be a suspension of work has diverted orders from us, which will be lost permanently if an actual stoppage occurs.

Side by side the miners of Arkansas and the Indian Territory have worked for years, receiving as high or higher wages than are paid in most of the coal regions of America, viz, Indian Territory miners receiving 75 cents per ton of 2,000 pounds for coal passing over a 1-inch screen, and 60 cents per ton for mine-run coal. Therefore, in consideration of this fact, steady work is more to be desired than an attempt to enforce higher wages, which would react and divert the trade back to our old rivals of Alabama and elsewhere who employ cheap labor.

We can not think that our men will by a rash act precipitate an unnecessary and entirely uncalled for strike. If they have any grievance, real or imaginary, we have not been apprised of it, all the time supposing that peace and prosperity were assured for the present year, if not for a longer period.

As above stated, a strike, whether long or short, can only be productive of loss to employer and employees.

Therefore, we ask that our men calmly deliberate before making a move which will only result in sorrow, disappointment, and loss to themselves and their families.

I write thus plainly so that all may understand the situation, while aiming to avoid a recurrence of the depressed conditions which followed in the wake of the great strike of 1894.

If there are any real grievances you are authorized to see the men and settle them, but I fail to understand that there are any real causes of complaint.

Yours, truly,

R. M. MCDOWELL, *General Manager.*

Prior to the 1st of July, 1899, the United Mine Workers formulated a further agreement which was also sent to some of the operators. Following is the text of the second agreement or demand:

AGREEMENT.

Articles of agreement made and entered into this the 1st day of July, A. D. 1899, by and between ——— ———, parties of the first part, and the United Mine Workers of America, District No. 21, parties of the second part.

Witnesseth, That the parties of the first part have agreed with the parties of the second part to adopt the following scale of prices and regulations governing the mining of coal at ——— ———, which said agreement between the parties hereto shall be in force and effect from the date hereof until September 1, 1900—that is to say:

First. All coal mined by the parties of the first part shall be weighed before being screened, and 2,000 pounds shall constitute a ton.

Second. That the party of the first part shall pay to the miners employed by it

for each ton of coal mined 55 cents per ton for Arkansas, except the Russellville and Spadra districts. The Russellville district shall be $1 per ton run of mine, and the Spadra district shall be 65 cents per ton run of mine, and 60 cents per ton run of mine for Indian Territory, the relative difference between pick miners and machine men remaining the same, except that the loaders shall receive 30 cents per ton for mine run in Indian Territory and 25 cents per ton run of mine for Arkansas.

The party of the first part reserves the right to discharge any miner or miners whose net ton of 2,000 pounds of run of mine coal will not yield, over the standard screens now in use, the average percentage of lump coal formerly obtained over said named screens.

Third. That the question of yardage and dead work be left to individual locals for settlement by agreement or arbitration.

Fourth. Miners and mine laborers shall be paid every two weeks after September 1, 1899.

Fifth. That the price of powder furnished by the party of the first part shall not exceed $2 per keg.

Sixth. That the party of the first part shall pay to its drivers 12½ cents per shift.

Seventh. That the parties of the first part shall pay a uniform price of trappers, $1 per shift.

Eighth. That the parties of the first part shall pay to its timbermen, track layers, cagers, rope riders, and slope switchmen not less than $2.12½ per shift.

Ninth. The parties of the first part agree that when the driver receives a car of coal, and after it leaves the miner's room it is in charge of the company and the company shall be responsible for it. The average weight to be paid for broken cars.

Tenth. That shot firers shall receive not less than $2.75 per shift, and shall not be employed in any other capacity.

Eleventh. That the check weighman shall receive a check number, in order to receive his pay, the same as a miner; also, check-off system.

Twelfth. That eight hours' actual work shall constitute a day's work.

Thirteenth. That the parties of the first part shall not discriminate against the United Mine Workers of America.

Fourteenth. That all top hands shall not receive less than $1.50 per day.

Fifteenth. There shall be a board of arbitration, consisting of two operators and two miners, and when these four can not agree, they shall choose a fifth man.

Whenever a difficulty arises between the miners and the operators which can not be settled by the mine officers and the pit committee, it shall be referred to the district board of arbitration above referred to, and the operator and the miner or miners interested shall each appoint two members of said board, and these four, if necessary, when they can not agree, shall choose a fifth member. The mine and mines thus affected shall continue in operation pending the decision of said board of arbitration, and whatever decision shall be final and binding on all parties to said arbitration.

Sixteenth. It is agreed that the question of the mine physician or physicians be left to each local camp for settlement.

Seventeenth. It is further agreed between the parties hereto that they shall meet on the first Monday in June, 1900, in the city of Fort Smith, Ark., for the purpose of formulating a new contract, if one be desired, and all differences that they can not amicably settle between themselves shall be settled by a board of arbitration constituted as the board of arbitration above referred to, and the contract entered into shall be binding upon the parties hereto for one year from September 1, 1900.

Eighteenth. We, the undersigned, respective parties to the above agreement, have read the same and fully approved the decisions contained therein, and the party of the second part, on behalf of themselves and the members of their organization, bind themselves to faithfully carry out and stand by the agreements herein contained.

Witness our hands in duplicate, the day and year first above written.

——— ———. ——— ———.

——— ———. ——— ———.

The Osage Coal and Mining Company at Krebs have steadily run their mines all through the strike, and their output for the months of May and June has been greater than that of any previous year for the same months. They employ principally white labor, a large percentage of whom are Italians, and a few negroes. As this is the only company in the Territory whose old employees have remained at work, the United Mine Workers have concentrated their forces on this camp, but with very slight success. Occasionally a few men would quit, but their places were soon filled, and notwithstanding the constant exertion

and use of all the means usually adopted to induce or compel employees to quit, a large number of employees have steadily remained at work.

At Lehigh the miners of the Atoka Coal and Mining Company, or the larger percentage of them, quit work. In the meantime the Atoka Coal and Mining Company have been stripping a large body of coal and have had no trouble in getting all the teams and laborers needed, and have been putting out from 18 to 25 cars per day, except when stopped by rain, this having been a very rainy season. Their mine No. 5 has been idle during the strike and has remained so until the end of the current year; but, at this writing, the company is bringing in negroes from various States and a number of white men and have started up the mine. Mine No. 6, during about three months, ran with very few hands, but in the latter part of May and during June the company has imported negroes and the output of this mine is steadily increasing.

At Coalgate very little work has been done since March, the mines of the Southwestern Coal and Improvement Company being nearly entirely idle. Some stripping has been done. The firm of Perry Brothers, of Coalgate, acceded to the demands of the United Mine Workers and entered into an agreement with them. After a short period of work, however, the men quit. Perry Brothers thereon refused to pay the wages due and brought suit against the union for damages. The men have brought individual suits for wages, the mine in the meantime remaining idle.

At Wilburton the mines of Degnan & Co., the Ola Coal and Mining Company, and the Wilburton Coal Company have been greatly hampered, but during May and June steadily increased their output, which now exceeds that of corresponding months in previous years.

At Haileyville the Hailey Coal and Mining Company have worked with a reduced force. At Shady Point the Ozark Coal and Railway Company have also had to work with somewhat reduced force.

At Poteau the Indianola Coal and Railway Company signed the scale and acceded to the demands of the union, but in a very short time the men again struck and the mines have since been idle.

The mines of the Kansas and Texas Coal Company at Cherryvale have been worked under difficulties, but during May and June negroes have been brought in from various States, and the prospect now is that the output will constantly increase.

The Milby and Dow mines and the various smaller operations have by turns been idle or running with small force, but during the month of June the output will be as large as usual for that month.

Generally, while the work has been surrounded with more or less difficulties, the output of the Indian Territory during the strike has been greater than for any corresponding time in previous years. No doubt it has been somewhat more expensive to produce this coal during such disadvantageous circumstances, but this will probably be compensated for to some extent by the increased demand.

It is only to one in constant touch with the miners that the deplorable results consequent upon a strike are apparent. Lifelong friendships are sundered and undying enmities born; the results of thrift and the economy of years are thrown away; business men equally feel the effects of a strike, and communities which have before been prosperous and peaceful become disturbed and unsettled. It is safe to say that the average miner is of average intelligence and good habits, and that if the strike question could be eliminated the life and surroundings of the miner would be equal or superior to those of any other workman.

But it invariably takes from one to two years for a community to entirely recover from a strike, and therefore it can only be hoped that some more sensible way of redressing grievances or of arriving at understandings between employer and employed other than the present system of striking will be adopted, for a strike always does and, it would seem, always will eventually result in more or less suffering to the miner and his family and loss to the mine owners.

I append hereto copies of correspondence relative to thickness of pillars to be left between adjoining coal mines:

DEPARTMENT OF THE INTERIOR,
OFFICE UNITED STATES INDIAN INSPECTOR FOR INDIAN TERRITORY,
Muscogee, Ind. T., July 12, 1899.

SIR: Under date of the 19th ultimo the mining trustees for the Choctaw and Chickasaw nations submitted the question of how wide the pillar of coal should be between adjoining mines of two operators in those nations. I referred the matter to the Department under date of June 20, 1899, and I am now in receipt of the reply of the honorable Secretary of the Interior dated June 30, 1899, wherein he states:

"The Acting Commissioner concurs with you that the matter should be left to the mine inspector, but states that should the Department consider that it is not a matter over which the inspector should have supervision, the office is of the opinion that 200 feet pillar be left, as recommended by the inspector.

"Certainly, to a considerable extent, the inspector has jurisdiction in such matters, and the Department agrees with your recommendation that the size of such pillars should not, ordinarily, be less than 200 feet."

A copy of the said letter of the honorable Secretary is herewith transmitted for your information.

Very respectfully,

J. GEO. WRIGHT,
United States Indian Inspector for the Indian Territory.

MR. L. W. BRYAN,
United States Mine Inspector for Indian Territory,
South McAlester, Ind. T.

DEPARTMENT OF THE INTERIOR,
Washington, D. C., June 30, 1899.

SIR: The Department is in receipt of a letter of June 28, 1899, from the Acting Commissioner of Indian Affairs, transmitting your report relative to how wide the pillar of coal should be between adjoining mines of two operators.

You submit the statements of different coal operators and the mineral trustees of the Choctaw and Chickasaw nations, whose estimates of what the size should be vary from 60 feet to 100 feet. You also transmit a letter from the mine inspector of the Indian Territory to said trustees, in which he says such pillars should not be less than 200 feet. It is your opinion that this matter should be left to the United States mine inspector, as the manner of operating mines is under his jurisdiction; that you should hesitate to recommend a pillar less in width than suggested by him.

The Acting Commissioner concurs with you that the matter should be left to the mine inspector, but states that should the Department consider that it is not a matter over which the inspector should have supervision the office is of the opinion that 200 feet pillar be left as recommended by the inspector.

Certainly, to a considerable extent, the inspector has jurisdiction in such matters, and the Department agrees with your recommendation that the size of such pillars should not, ordinarily, be less than 200 feet.

Respectfully,

E. A. HITCHCOCK, *Secretary.*

UNITED STATES INDIAN INSPECTOR FOR THE INDIAN TERRITORY.

OFFICE OF UNITED STATES MINE INSPECTOR FOR INDIAN TERRITORY,
South McAlester, July 15, 1899.

DEAR SIR: I have yours relating to the size of pillars that should be left between coal companies' mines where the leases adjoin and the workings are driven toward each other; also the copy of letter from the honorable Secretary of the Interior.

I take the position that 200 feet is the limit of safety, as that leaves each one 100 feet on their side of the line, and in case of either parties abandoning their works and same filling with water, with a less thickness of pillar and the danger of inac-

curate survey or encroachment by either party, there might be and would be great danger to the mine in operation by breaking into any body of water that might be in the abandoned workings. Where mines adjoin closely the safest thing to do would be to break from one mine into the other; then both would have to be kept pumped out in order to operate either, and an additional escapement would be had. I can not agree to any thickness of pillar less than 200 feet.

Yours, truly,

L. W. BRYAN,
United States Mine Inspector for Indian Territory.

Hon. J. GEO. WRIGHT,
United States Indian Inspector, Muscogee, Ind. T.

LEGISLATION AFFECTING MINING IN THE INDIAN TERRITORY.

Since the issuance of my last report the Choctaws and Chickasaws, by vote, have ratified the agreement made between the Dawes Commission and the said nations, and therefore the agreement governs in regard to mineral leases in those nations. In the Creek and Cherokee nations, however, the provisions of the act of Congress approved June 28, 1898, and known as the Curtis bill, govern. I append a copy of the Dawes agreement so far as it relates to the mining industry, followed by the rules and regulations of the Secretary of the Interior, and circulars of the United States Indian inspector and coal trustees in relation thereto. Following these I give a copy of that portion of the Curtis bill which is applicable to the mining industry in the Creek and Cherokee nations, with the rules and regulations and circulars in regard to the two latter nations.

Following is the portion or portions of the Dawes or Atoka agreement relating to mining leases in the Choctaw and Chickasaw nations, Indian Territory:

It is agreed that all the coal and asphalt within the limits of the Choctaw and Chickasaw nations shall remain and be the common property of the members of the Choctaw and Chickasaw tribes (freedmen excepted), so that each and every member shall have an equal and undivided interest in the whole; and no patent provided for in this agreement shall convey any title thereto. The revenues from coal and asphalt, or so much as shall be necessary, shall be used for the education of the children of Indian blood of the members of said tribes. Such coal and asphalt mines as are now in operation, and all others which may hereafter be leased and operated, shall be under the supervision and control of two trustees, who shall be appointed by the President of the United States, one on the recommendation of the principal chief of the Choctaw Nation, who shall be a Choctaw by blood, whose term shall be for four years, and one on the recommendation of the governor of the Chickasaw Nation, who shall be a Chickasaw by blood, whose term shall be for two years, after which the term of appointees shall be for four years. Said trustees, or either of them, may, at any time, be removed by the President of the United States for good cause shown. They shall each give bond for the faithful performance of their duties, under such rules as may be prescribed by the Secretary of the Interior. Their salaries shall be fixed and paid by their respective nations, each of whom shall make full report of all his acts to the Secretary of the Interior quarterly. All such acts shall be subject to the approval of said Secretary.

All coal and asphalt mines in the two nations, whether now developed or to be hereafter developed, shall be operated and the royalties therefrom paid into the Treasury of the United States, and shall be drawn therefrom under such rules and regulations as shall be prescribed by the Secretary of the Interior.

All contracts made by the national agents of the Choctaw and Chickasaw nations for operating coal and asphalt with any person or corporation, which were on April twenty-third, eighteen hundred and ninety-seven, being operated in good faith, are hereby ratified and confirmed, and the lessee shall have the right to renew the same when they expire, subject to all the provisions of this act.

All agreements heretofore made by any person or corporation with any member or members of the Choctaw or Chickasaw nations, the object of which was to obtain such member or members' permission to operate coal or asphalt, are hereby declared void: *Provided*, That nothing herein contained shall impair the rights of any holder or owner of a leasehold interest in any oil, coal rights, asphalt, or mineral which have been assented to by act of Congress, but all such interests shall continue unim-

paired hereby, and shall be assured by new leases from such trustees of coal or asphalt claims described therein, by application to the trustees within six months after the ratification of this agreement, subject, however, to payment of advance royalties herein provided for.

All leases under this agreement shall include the coal or asphaltum or other mineral, as the case may be, in or under nine hundred and sixty acres, which shall be in a square as nearly as possible, and shall be for thirty years. The royalty on coal shall be fifteen cents per ton of two thousand pounds on all coal mined, payable on the twenty-fifth day of the month next succeeding that in which it is mined. Royalty on asphalt shall be sixty cents per ton, payable same as coal: *Provided*, That the Secretary of the Interior may reduce or advance royalties on coal and asphalt when he deems it for the best interests of the Choctaws and Chickasaws to do so. No royalties shall be paid, except into the United States Treasury, as herein provided.

All lessees shall pay on each coal or asphalt claim at the rate of one hundred dollars per annum in advance for the first and second years, two hundred dollars per annum in advance for the third and fourth years, and five hundred dollars for each succeeding year thereafter. All such payments shall be treated as advance royalty on the mine or claim on which they are made, and shall be a credit as royalty when each said mine is developed and operated and its production is in excess of such guaranteed annual advance payments, and all persons having coal leases must pay said annual advance payments on each claim whether developed or undeveloped: *Provided, however*, That should any lessee neglect or refuse to pay such advanced annual royalty for the period of sixty days after the same becomes due and payable on any lease, the lease on which default is made shall become null and void, and the royalties paid in advance thereon shall then become and be the money and property of the Choctaw and Chickasaw nations.

In surface, the use of which is reserved to present coal operators, shall be included such lots in towns as are occupied by lessees' houses, either occupied by said lessees' employees or as offices or warehouses: *Provided, however*, That in those town sites designated and laid out under the provision of this agreement, where coal leases are now being operated and coal is being mined, there shall be reserved from appraisement and sale all lots occupied by houses of miners actually engaged in mining, and only while they are so engaged, and in addition thereto a sufficient amount of land, to be determined by the town-site board of appraisers, to furnish homes for the men actually engaged in working for the lessees operating said mines, and a sufficient amount for all buildings and machinery for mining purposes: *And provided further*, That when the lessees shall cease to operate said mines, then, and in that event, the lots of land so reserved shall be disposed of by the coal trustees for the benefit of the Choctaw and Chickasaw tribes.

That whenever the members of the Choctaw and Chickasaw tribes shall be required to pay taxes for the support of schools, then the fund arising from such royalties shall be disposed of for the equal benefit of their members (freedmen excepted) in such manner as the tribes may direct.

It is further agreed that the United States courts now existing or that may hereafter be created in the Indian Territory shall have exclusive jurisdiction of all controversies growing out of the titles, ownership, occupation, possession, or use of real estate, coal, and asphalt in the territory occupied by the Choctaw and Chickasaw tribes, and of all persons charged with homicide, embezzlement, bribery, and embracery, breaches or disturbances of the peace, and carrying weapons, hereafter committed in the territory of said tribes, without reference to race or citizenship of the person or persons charged with such crime, and any citizen or officer of the Choctaw or Chickasaw nations charged with such crime shall be tried and, if convicted, punished as though he were a citizen or officer of the United States.

Regulations prescribed by the Secretary of the Interior to govern mineral leases and other matters in the Choctaw and Chickasaw nations, Indian Territory, under the provisions of the agreement of April 23, 1897, between the Commission to the Five Civilized Tribes and the said Choctaw and Chickasaw nations, as ratified by act of Congress of June 28, 1898. (*30 Stat., 495.*)

MINERAL LEASES.

1. The agreement with the Choctaw and Chickasaw nations, set out in section 29 of the act of Congress entitled "An act for the protection of the people of the Indian Territory, and for other purposes," approved June 28, 1898 (30 Stat., 495-510), which was duly ratified on August 24, 1898, provides that the leasing and operating of coal, asphalt, and other mineral lands in said nations shall be under the control of two trustees appointed by the President of the United States upon the recommendation of the executives of said nations, each of whom shall be an Indian by blood of the respective nation for which he may be appointed.

2. Each trustee to be appointed under the provisions of said agreement shall be

required to file a bond, with two good and sufficient sureties or an approved trust or surety company, with the Secretary of the Interior in the penal sum of ten thousand dollars, conditioned for the faithful performance of his duties under said agreement as prescribed therein, and in accordance with these regulations. Said bonds shall be approved by the Secretary of the Interior before said trustees shall be permitted to enter upon their duties.

3. It shall be the duty of the trustees to receive applications from parties desiring to make leases of lands within the Choctaw and Chickasaw nations for the purpose of engaging in the mining of coal, asphalt, or other minerals, to examine said applications and transmit the same, with report of facts, to the United States Indian inspector stationed in the Indian Territory, and on receipt of authority from him for that purpose to enter jointly into leases with all parties to whom the privilege of leasing lands in said nations for mining purposes shall be approved by him in such form as shall be prescribed by the Secretary of the Interior.

Said trustees shall also make an examination from time to time, as often as it shall be deemed expedient, and at least once in every month, into the operations of all persons, corporations, or companies operating mines within said nations, with a view to ascertaining the quantity of minerals produced by each, the amount of royalty, if any, due and unpaid by each, and all other information necessary for the protection of the interests of the Choctaw and Chickasaw nations in the premises; and for this purpose all persons, corporations, or companies operating mines within the Choctaw and Chickasaw nations shall give said trustees access to any and all of their books and records necessary or required by them to be examined, and at the end of each quarter said trustees shall make a report to the Secretary of the Interior, through said Indian inspector, of all their acts under said agreement and these regulations.

4. All indentures of lease made by the trustees, as above provided, shall be in quadruplicate and shall contain a clear and full description by legal subdivisions of the tract or tracts of land covered thereby, not to exceed nine hundred and sixty acres, which legal subdivisions must be contiguous to each other. Said indentures of lease so executed shall be transmitted through the United States Indian inspector stationed in the Indian Territory to the Commissioner of Indian Affairs, for submission to the Secretary of the Interior, for his approval, and no lease shall be valid until the same shall have been approved by the Secretary of the Interior.

5. Royalties shall be required of all lessees as follows, viz:

On coal, fifteen[1] cents per ton for each and every ton of coal produced weighing two thousand pounds.

On asphalt, sixty cents per ton for each and every ton produced weighing two thousand pounds.

The right is reserved, however, by the Secretary of the Interior in special cases to either reduce or advance the royalty on coal and asphalt on the presentation of facts which, in his opinion, make it to the interest of the Choctaw and Chickasaw nations, but the advancement or reduction of royalty on coal and asphalt in a particular case shall not operate in any way to modify the general provisions of this regulation fixing the minimum royalty as above set out.

On gilsonite, elaterite, and other like mineral substances the royalty shall be fixed according to the comparative market value of the same to the value of asphalt.

On oil, ten per centum of the value of all oil produced, the royalty to be ascertained on the value of the oil produced in its crude state, and on all other minerals, such as gold, silver, iron, and the like, as follows, sampling charges to be first deducted: On all net smelter returns of ore of fifty ($50) dollars per ton and under, a royalty of ten (10) per cent; on all net smelter returns of ore over fifty ($50) dollars per ton and less than one hundred and fifty ($150) dollars per ton, a royalty of fifteen (15) per cent; on all net smelter returns of ore over one hundred and fifty ($150) dollars per ton and less than three hundred ($300) dollars per ton, a royalty of twenty (20) per cent; and on all net smelter returns of ore over three hundred ($300) dollars per ton, a royalty of twenty-five (25) per cent.

Provided, That all lessees shall be required to pay advanced royalties, as provided in said agreement, on all mines or claims, whether developed or not, to be "a credit on royalty when each said mine is developed and operated and its production is in excess of such guaranteed annual advanced payments," as follows, viz: One hundred dollars per annum in advance for the first and second years, two hundred dollars per annum in advance for the third and fourth years, and five hundred dollars in advance for each succeeding year thereafter; and that, should any lessee neglect or refuse to pay such advanced royalty for the period of sixty days after the same becomes due and payable on any lease, the lease on which default is made shall

[1] By an amendment to these Rules and Regulations, issued January 6, 1899, the Secretary of the Interior changed the rate of royalty on coal to 10 cents for each and every ton of screened coal.

become null and void, and all royalties paid in advance shall be forfeited and become the money and property of the Choctaw and Chickasaw nations.

6. That all lessees of sand or gravel deposits shall be required to pay a royalty of not less than two cents per cubic yard for all such material removed, to be measured as the same may lie in the original deposit; and for this purpose the lessee shall, before removal, cause such levels or bench marks to be established or laid out as may be necessary to provide for the proper measurement of the quantity removed after the same has been excavated. And all lessees of stone quarries shall be required to pay a royalty on granite of not less than ten cents per cubic yard for all stone quarried, measured by run of quarry, and on all stone other than granite the royalty shall be proportionate to the comparative value of such stone with the value of granite, as may be agreed upon.

7. All lessees of oil, coal, asphalt, or other minerals on land allotted, sold, or reserved shall be required, before the commencement of operations, to pay to the individual owner the value of the use of the necessary surface for prospecting and mining, including the right of way for necessary railways and the damage done to the lands and improvements; and in case of disagreement, for the purpose of the ascertainment of the fair value of the use of the land and the actual damage done, the owner of the land and the lessee shall each select an arbitrator, who, together with such person as shall be appointed or designated by the inspector located in the Indian Territory, shall constitute a board to consider and ascertain the amount that shall be paid by the lessee on account of use of the land and damage done, and the award of such board shall be final and conclusive, unless the award be impeached for fraud. All timber and other materials taken by the lessee from land allotted, sold, or reserved for use in the erection of buildings thereon, and in the mine or mines operated by him thereon, as for shoring levels in coal mines, and so forth, shall be paid for by the lessee at the usual rates.

8. The owners or holders of leases which have been assented to by any act of Congress shall be required within six months from August 24, 1898, to enter into new leases with the said trustees under the provisions of said agreement, said leases to be subject to all the provisions of said agreement and of these rules and regulations, and any others that may hereafter be made by the Secretary of the Interior under the provisions of said agreement.

9. Persons, corporations, and companies who, under the customs and laws of the Choctaw and Chickasaw nations, have made leases with the national agents of said nations of lands therein for the purpose of mining coal, asphalt, or other minerals, and who, prior to April 23, 1897, had taken possession of and were operating in good faith any mine of coal, asphalt, or other minerals in said nation, shall be protected in their right to continue the operation of such mines for the period and on the terms contained in the lease made to said persons, corporations, or companies by such national agents, and shall have the right, at the expiration of said term, to renew the lease of such mines, subject, however, to all the provisions of the said agreement and of these regulations: *Provided*, That such persons, corporations, or companies shall, within sixty days after the expiration of their leases with the national agents of the Choctaw and Chickasaw nations, apply to the said trustees for a renewal of their leases under said agreement. And all corporations which, under charters obtained in accordance with the laws of the Chickasaw Nation, had entered upon and improved and were occupying and operating any mine of coal, asphalt, or other mineral within said Chickasaw Nation shall have a preference right to lease the mines occupied and operated by such corporations, subject to all the general provisions of said agreement and of these regulations: *Provided*, That should there arise a controversy between two or more of such corporations, the respective rights of each shall be determined after an investigation by the inspector located in the Indian Territory, subject to appeal to the Commissioner of Indian Affairs, and from him to the Secretary of the Interior.

10. All leases made prior to April 23, 1897, by any person or corporation, with any member or members of the Choctaw or Chickasaw nations, the object of which was to obtain the permission of such member or members to operate coal or asphalt mines within the said nations, are declared void by said agreement, and no person, corporation, or company occupying any lands within either of said nations, under such individual leases, or operating coal or other mines on such lands, under color of such leases, shall be deemed to have any right or preference in the making of any lease or leases for mining purposes embracing the lands covered by such personal leases, by reason thereof; but parties in possession of mineral land who have made improvements thereon for the purpose of mining shall have a preference right to lease the land upon which said improvements have been made, under the provisions of said agreement and these regulations.

11. Where two or more persons, corporations, or companies shall make application for the leasing of the same tract of land for mining purposes, and a controversy arises between such persons, corporations, or companies as to the right of each to obtain the lease of such land, it shall be the duty of the United States Indian

inspector stationed in the Indian Territory to investigate into the rights of the parties and determine as to which shall be given the right to lease the lands in controversy, subject to appeal as above stated in paragraph 9.

12. All lessees will be required to keep a full and correct account of all their operations under leases entered into under said agreement and these regulations, and their books shall be open at all times to the examination of said trustees, of the United States Indian inspector stationed in the Indian Territory, and such other officer or officers of the Indian department as shall be instructed by the Secretary of the Interior or the Commissioner of Indian Affairs to make such examination; but, except as to the said trustees and the United States Indian inspector located in the Indian Territory, no lessee will be held to have violated this regulation for refusing to permit an examination of his books by any person unless such person shall produce written instructions from the Secretary of the Interior or from the Commissioner of Indian Affairs requiring him to make such an examination, and said lessees shall make all their reports to said United States Indian inspector, and they shall be subject to any instructions given by him.

13. All royalties, including advanced royalties, as provided for in said agreement and in these regulations, shall be payable in lawful money of the United States to the United States Indian agent at the Union agency in the Indian Territory, who shall be at all times under the direction and supervision of the United States Indian inspector for the Indian Territory. The advanced royalties are payable one hundred dollars on the making of the lease, one hundred dollars in one year thereafter, two hundred dollars two years thereafter, two hundred dollars three years thereafter, and five hundred dollars on the fourth and each succeeding year until the end of the term thereof.

All other royalties, in accordance with the schedule provided in these regulations, unless modified in any particular case by the Secretary of the Interior, as herein provided, shall be payable to said United States Indian agent monthly, and shall be paid on or before the twenty-fifth day of the month succeeding the date when such monthly royalties shall have accrued. All monthly royalties shall be accompanied by a sworn statement, in duplicate, by the person, corporation, or company making the same as to the output of the mine of such person, corporation, or company for the month for which royalties may be tendered. One part of said sworn statement shall be filed with the United States Indian agent, to be transmitted to the Commissioner of Indian Affairs, and the other part thereof shall be filed with the United States Indian inspector located in the Indian Territory.

14. The said United States Indian agent shall receive and receipt for all royalties paid into his hands when accompanied by a sworn statement as above provided, but not otherwise; and all royalties received by him shall be, as soon as practicable, deposited with the United States subtreasurer at St. Louis, in like manner as are deposited moneys known in the regulations of the Indian Office as Miscellaneous receipts, Class III, with a statement showing the proportionate shares of each of the Choctaw and Chickasaw nations.

15. All royalties collected and deposited by the United States Indian agent, as above set forth, shall be held to the credit of the Choctaw and Chickasaw nations in their respective proportions, and shall be subject to disbursement by the Secretary of the Interior for the support of the schools of the Choctaw and Chickasaw nations in accordance with said agreement.

16. All lessees under said agreement and these regulations will be required to give bond, with two good and sufficient sureties or an approved surety company, for the faithful discharge of their obligations under their leases in such penalties as shall be prescribed in each case by the Secretary of the Interior, and until such bond is filed by the lessee and approved and accepted by the Secretary of the Interior no rights or interests under any lease shall accrue to such lessee.

17. The right to alter or amend these regulations is reserved.

CORNELIUS N. BLISS,
Secretary of the Interior.

DEPARTMENT OF THE INTERIOR,
Washington, October 7, 1898.

INDIAN TERRITORY MINING LEASE (CHOCTAW AND CHICKASAW NATIONS).

Indenture of lease, made and entered into in quadruplicate on this —— day of ——, A. D. 189 , by and between —— —— and —— —— as mining trustees of the Choctaw and Chickasaw nations, parties of the first part, and —— ——, of ——, county of ——, State of ——, part of the second part, under and in pursuance of the provisions of the act of Congress approved June 28, 1898 (30 Stats., 495), the agreement set out in section twenty-nine thereof duly ratified on August 24, 1898, and the rules and regulations prescribed by the Secretary of the Interior on October 7, 1898, relative to mining leases in the Choctaw and Chickasaw nations.

Now, therefore, this indenture witnesseth, that the parties of the first part, for and in consideration of the royalties, covenants, stipulations, and conditions hereinafter contained and hereby agreed to be paid, observed, and performed by the part of the second part, —— executors, administrators, or assigns, do hereby demise, grant, and let unto the part of the second part, —— executors, administrators, or assigns, the following-described tract of land, lying and being within the —— Nation, and within the Indian Territory, to wit: The —— of section —— of township[1] —— of range[2] —— of the Indian meridian, and containing —— acres, more or less, for the full term of —— years from the date hereof for the sole purpose of prospecting for and mining[3] —— ——.

In consideration of the premises the part of the second part hereby agree and bind ——, executors, administrators, or assigns, to pay or cause to be paid to the United States Indian agent for the Union Agency, Indian Territory, as royalty, the sums of money as follows, to wit:

On the production of all coal mines developed and operated under this lease the sum of —— cents per ton for each and every ton of coal produced.

On asphaltum the sum of —— cents per ton for each and every ton produced.

On oil the sum of —— per centum of the value of all oil produced.

On all other minerals, such as gold, silver, iron, and the like, as follows (sampling charges to be first deducted): On all net smelter returns of ore of fifty ($50) dollars per ton and under, a royalty of ten (10) per cent; on all net smelter returns of ore over fifty ($50) dollars per ton and less than one hundred and fifty ($150) dollars per ton, a royalty of fifteen (15) per cent; on all net smelter returns of ore over one hundred and fifty ($150) dollars per ton and less than three hundred ($300) dollars per ton, a royalty of twenty (20) per cent, and on all net smelter returns of ore over three hundred ($300) dollars per ton, a royalty of twenty-five (25) per cent.

And all said royalties accruing for any month shall be due and payable on or before the twenty-fifth day of the month succeeding.

And the part of the second part further agree and bind ——, executors, administrators, or assigns to pay or cause to be paid to the United States Indian agent for the Union Agency, Indian Territory, as advanced royalty on each and every mine or claim within the tract of land covered by this lease the sums of money as follows, to wit: One hundred dollars per annum, in advance, for the first and second years; two hundred dollars per annum, in advance, for the third and fourth years, and five hundred dollars per annum, in advance, for the fifth and each succeeding year thereafter of the term for which this lease is to run, it being understood and agreed that said sums of money to be paid as aforesaid shall be a credit on royalty should the part of the second part develop and operate a mine or mines on the lands leased by this indenture, and the production of such mine or mines exceed such sums paid as advanced royalty as above set forth, and further, that should the part of the second part neglect or refuse to pay such advanced annual royalty for the period of sixty days after the same becomes due and payable under this lease, then this lease shall be null and void, and all royalties paid in advance shall become the money and property of the Choctaw and Chickasaw tribes of Indians, subject to the regulations of the Secretary of the Interior aforesaid.

The part of the second part further covenant and agree to exercise diligence in the conduct of the prospecting and mining operations, and to open mines or sink wells for oil, and operate the same in a workmanlike manner to the fullest possible

[1] State whether north or south. [2] State whether east or west. [3] State what mineral is sought.

extent on the above-described tract of land; to commit no waste upon said land or upon the mines that may be thereon, and to suffer no waste to be committed thereon; to take good care of the same, and to surrender and return the premises at the expiration of this lease to the parties of the first part in as good condition as when received, ordinary wear and tear in the proper use of the same for the purposes hereinbefore indicated and unavoidable accidents excepted, and not to remove therefrom any buildings or improvements erected thereon during said term by —— the part of the second part, but said buildings and improvements shall remain a part of said land and become the property of the owner of the land as a part of the consideration for this lease, in addition to the other considerations herein specified—except engines, tools, and machinery, which shall remain the property of the said part of the second part; that —— will not permit any nuisance to be maintained on the premises, nor allow any intoxicating liquors to be sold or given away to be used for any purposes on the premises, and that —— will not use the premises for any other purpose than that authorized in this lease, nor allow them to be used for any other purpose; that —— will not at any time during the term hereby granted assign or transfer —— estate, interest, or term in said premises and land or the appurtenances thereto to any person or persons whomsoever without the written consent thereto of the parties of the first part being first obtained, subject to the approval of the Secretary of the Interior.

And the said part of the second part further covenant and agree that —— will keep an accurate account of all mining operations, showing the whole amount of mineral mined or removed, and that there shall be a lien on all implements, tools, movable machinery, and other personal chattels used in said prospecting and mining operations, and upon all such minerals, metals, and substances obtained from the land herein leased, as security for the monthly payment of said royalties.

And the part of the second part agree that this indenture of lease shall be subject in all respects to the rules and regulations heretofore or that may be hereafter prescribed, under the said act of June 28, 1898, by the Secretary of the Interior relative to mineral leases in the Choctaw and Chickasaw nations; and further, that should the part of the second part, —— executors, administrators, or assigns, violate any of the covenants, stipulations, or provisions of this lease, or fail for the period of thirty days to pay the stipulated monthly royalties provided for herein, then the Secretary of the Interior shall be at liberty, in his discretion, to avoid this indenture of lease, and cause the same to be annulled, when all the rights, franchises, and privileges of the part of the second part, —— executors, administrators, or assigns, hereunder shall cease and end, without further proceedings.

The part of the second part firmly bound for the faithful compliance with the stipulations of this indenture by and under the bond made and executed by the part of the second part as principal and —— —— as suret entered into the —— day of ——, 189—, and which is on file in the Indian Office.

In witness whereof the said parties of the first and second parts have hereunto set their hands and affixed their seals the day and year first above mentioned.

[1] Witnesses:

—— —— as to —— —— [SEAL.][2]
Trustee for Choctaw Nation.

—— —— as to —— —— [SEAL.]
Trustee for Chickasaw Nation.

—— ——
—— —— } as to —— —— [SEAL.]

—— ——
—— —— } as to —— —— [SEAL.]

—— ——
—— —— } as to —— —— [SEAL.]

—— ——
—— —— } as to —— —— [SEAL.]

—— ——
—— —— } as to —— —— [SEAL.]

(Indorsed:) No. —— Department of the Interior, Washington, D. C., mineral lease, —— ——, *Mining Trustees.* To —— ——, of —— sec. ——, Tp ——, R. ——, in the —— Nation, Indian Territory. Dated ——, 189—. Expires ——, 19—.

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[1] Two witnesses to each signature, including signatures of trustees.

[2] Stamps are required by the act of June 13, 1898, to be placed on leases as follows, viz: Leases for one year, 25 cents; for more than one year and not exceeding three years, 50 cents, and for more than three years, $1. Lessees must furnish stamps for all leases.

DEPARTMENT OF THE INTERIOR,
U. S. INDIAN SERVICE, UNION AGENCY,
Muscogee, I. T., ——— ——, *189—*.

Respectfully forwarded to the Commissioner of Indian Affairs for consideration with my report of even date.

——— ———, *Indian Inspector.*

DEPARTMENT OF THE INTERIOR,
OFFICE OF INDIAN AFFAIRS,
Washington, D. C., ——— ——, *189—*.

Respectfully submitted to the Secretary of the Interior with favorable recommendation.

——— ———, *Commissioner.*

DEPARTMENT OF THE INTERIOR,
Washington, D. C., ——— ——, *189—*.

Approved:

——— ———, *Secretary of the Interior.*

BOND.

Know all men by these presents that we [1] ——— ———, of ———, as principals, and ——— ———, of ———, and ——— ———, of ———, as sureties, are held and firmly bound unto the United States of America in the sum of ——— dollars, lawful money of the United States, for the payment of which, well and truly to be made, we bind ourselves, and each of us, our heirs, successors, executors, and administrators, jointly and severally, firmly by these presents. Sealed with our seals, and dated —— day of ———, eighteen hundred and ninety ——.

The condition of this obligation is such, that whereas the above bounden ——— ———, as principal —, entered into a certain indenture of lease, dated ———, 189—, with ——— ——— and ——— ———, mining trustees of the Choctaw and Chickasaw nations, for the lease of a certain tract of land located in the ——— Nation, Indian Territory, for the purpose of prospecting for and mining ——— for the period of ——— years.

Now, if the above bounden ——— ——— shall faithfully carry out and observe all the obligations assumed in said indenture of lease by ———, and shall observe all the laws of the United States, and regulations made or which shall be made thereunder, for the government of trade and intercourse with Indian tribes, and all the rules and regulations that have been or may be prescribed by the Secretary of the Interior under the act of June 28, 1898 (30 Stat., 495), relative to mining leases in the Choctaw and Chickasaw nations in the Indian Territory, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed in the presence of [2] —

——— ———.		——— ———.	[L. S.] [3]
——— ———.		——— ———.	[L. S.]
——— ———.		——— ———.	[L. S.]
——— ———.		——— ———.	[L. S.]
——— ———.		——— ———.	[L. S.]
		——— ———.	[L. S.]

(Indorsed:) Department of the Interior, Washington, D. C. Bond of .... lessee..of.....in the.....Nation, Indian Territory, for mining purposes. Dated .....189.. Approved: ...., *Secretary.*

AFFIDAVIT OF SURETY.

[To be used only when individual sureties are offered.]

——— OF ——— *county of,* ——— *ss:*

I, ——— ———, one of the sureties on the prefixed bond of ——— ——— as ——— do depose and say that I am worth, in unincumbered property, over and above my debts, liabilities, and exemptions under the laws of the ——— of ——— dollars and upward, as follows:

---

[1] The Christian names and residences of principals, and of the sureties, where personal sureties are given, of whom there must be two.

[2] There must be at least two witnesses to all signatures, though the same two persons may witness all.

[3] A seal must be attached by some adhesive substance to the signatures of principals and sureties.

Real estate, valued at $———, situate in ———, and consisting of[1] ——— and
Personal estate, valued at $———, located in ———, and consisting of[2] ———.
(Signature:) ——— ———,
(Post-office address:) ——— ———

Sworn to and subscribed before me this —— day of ———, 189–.
[SEAL.] ——— ———,
——— ———.

——— OF ——— *county of*, ———, *ss:*

I, ——— ——— do hereby certify that ——— ———, who administered the above oath, was at the time of doing so a ——— in and for said ———, duly qualified to act as such and to administer oaths in such cases, and that I believe his signature, as above written, is genuine.

In testimony whereof I have hereto set my hand and affixed the seal of ——— this —— day of ——— one thousand eight hundred and ninety ——.

——— ———,
——— ———.

DEPARTMENT OF THE INTERIOR,
Washington, D. C., January 6, 1899.

Amendment to regulations governing mineral leases and other matters in the Choctaw and Chickasaw nations in the Indian Territory, approved October 7, 1898.

In pursuance of the decision of the Department of even date herewith, in the matter of royalty required of lessees of coal lands in the Choctaw and Chickasaw Indian nations, the second and third lines of paragraph 5 of "Regulations governing mineral leases and other matters in the Choctaw and Chickasaw Indian nations, in Indian Territory, prescribed by the Secretary of the Interior, under the provisions of the agreement of April 23, 1897, between the commission to the Five Civilized Tribes and the said Choctaw and Chickasaw nations, as ratified by act of Congress of June 28, 1898 (30 Stats., 495)," are hereby amended, to take effect from January 1, 1899, so as to read:

"On coal, 10 cents per ton of 2,000 pounds, screened over meshes 1 inch square."

THOS. RYAN, *Acting Secretary.*

The information contained in this circular letter is given to parties who wish to make leases of minerals in the Choctaw and Chickasaw nations for their information, and with the hope that it will enable them to comply with the rules and regulations issued by the Department of the Interior October 7, 1898.

The following form of application will suffice:

"Mr. N. B. AINSWORTH,
"*Mineral Trustee for Choctaw Nation.*

"Mr. L. C. BURRIS,
"*Mineral Trustee for Chickasaw Nation, McAlester, Ind. T.*

GENTLEMEN:—Application is hereby made to you to lease for mining purposes for the term of thirty years the coal (or other mineral, as the case may be) in or under the following-described tracts of land."

Here give the exact section or subdivision thereof, with the number of acres of each, carried out to a column, as—

	Acres.
S W. ¼ of section 16	160
E. ½ of section 17	320
N. E. ¼ of section 20	160
W ½ of section 23	320
Total	960

[1] Here state whether city property, improved or unimproved, or improved farms or unimproved lands. Property must be described by street numbers, lot numbers, or section and township numbers.

[2] Here describe the nature of the property, whether notes, bonds, stocks, merchandise, etc. State also the present market value as near as practicable.

All in township 5 north, range 27 east. This application is made under the rules and regulations of the Interior Department issued October 7, 1898."

The sections or subdivisions thereof must make a sum total of 960 acres, which shall be in a square as nearly as possible. Any claim extending 1 mile or 1½ miles along the crop and 1 mile with the pitch will be considered as nearly in a square. But the claim must not extend more than 1½ miles along the crop. We prefer the claim to be 1 mile on the crop and 1½ miles with the pitch. When the land sought to be leased lies in more than one township and range, the townships and ranges must be given.

Applications must be made in quadruplicate and in typewritten form (one original and three carbon copies will answer).

In signing applications in quadruplicate, each applicant must sign in full his first Christian name; and when the applicant is a corporation, the name of the State under whose laws the corporation is organized must be given.

The application must be accompanied by a correct tracing map, 9 inches long by 7 inches wide, and six blue prints of the lands sought to be leased.

On receipt of the application thus made it will be filed in the general office of the mineral trustees, at McAlester, Ind. T. One copy of the application, with map attached, will be returned to the applicant; the other copies are for the general office.

Written notice will be given the applicant when the trustees will examine in person the lands sought to be leased, at which time and place the applicant will be expected to furnish the trustees full information about the application, and whether anyone else has, or claims to have, any rights to such lands.

If the trustees are satisfied that the applicant is entitled to a lease, they will so recommend to the United States Indian inspector, and, when given authority by him, will enter into leases in quadruplicate with the applicant.

The trustees will make these leases in due form, and when convenient the applicants will be expected to come to the general office to sign such leases; but when this would be too great inconvenience, the trustees will send by mail or express these leases to the applicants to be signed by them.

The trustees will also furnish blank bonds and affidavits of surety, to be filled out and duly executed by the applicants. The bond for a coal lease will be $50,000, and for an asphalt or any other mineral lease, $5,000. All parties must qualify to these bonds before a judge of the United States court or a district attorney thereof.

The internal-revenue stamp to be placed on each bond, regardless of the amount of the bond, will be 50 cents.

Internal-revenue stamps must also be placed on one copy only of each lease and must be in the sum of $1.

The advanced royalty of $100 on each lease will be due and payable to the United States Indian agent at Muskogee, Ind. T., when the leases are ready to be delivered.

This letter is intended to comply in every respect with the Atoka agreement of April 23, 1897, and with the rules and regulations of the Department of the Interior, issued October 7, 1898; and is issued for no other purpose than to give all the information we can to parties having business with the general office, and to save as much correspondence as possible by the trustees.

All parties making applications are requested to exercise patience, as the trustees will take up applications as soon as each can be reached, taking up each application where it is possible in its turn.

The duties of the trustees are various. They have to comply strictly with the rules of the Department in all cases; and, when in doubt as to their duties in the premises, have to refer the question to the Department for its opinion and direction. This, of course, takes time.

Parties from a distance having business with the trustees should have an agreed day for the time of meeting before starting.

Respectfully,

N. B. AINSWORTH,
L. C. BURRIS,
Trustees.

The following is the portion or portions of the Curtis bill applicable to the Creek and Cherokee nations, with the rules and regulations in regard to mining leases in such nations:

The act of Congress for the protection of the people of the Indian Territory, and for other purposes, approved June 28, 1898, known as the "Curtis bill," makes the following provisions which affect the coal-mining industry:

"SEC. 15. * * * The person authorized by the tribe or tribes may execute or deliver to any such purchaser, without expense to him, a deed conveying to him the title to such lands or town lots, and thereafter the purchase money shall become the property of the tribe, and all such moneys shall, when titles to all the lots in the towns belonging to any tribe have been thus perfected, be paid per capita to the members of the tribe: *Provided, however,* That in those town sites designated and

laid out under the provisions of this act where coal leases are now being operated and coal is being mined there shall be reserved from appraisement and sale all lots occupied by houses of miners actually engaged in mining, and only while they are so engaged, and in addition thereto a sufficient amount of land, to be determined by the appraisers, to furnish homes for the men actually engaged in working for the lessees operating said mines, and a sufficient amount for all buildings and machinery for mining purposes: *And provided further*, That when the lessees shall cease to operate said mine, then and in that event the lots of land so reserved shall be disposed of as provided for in this act.

"SEC. 16. That it shall be unlawful for any person, after the passage of this act, except as hereinafter provided, to claim, demand, or receive, for his own use, or for the use of anyone else, any royalty on oil, coal, asphalt, or other mineral, or on any timber or lumber, or any other kind of property whatsoever, or any rents on any lands or property belonging to any one of said tribes or nations in said Territory, or for anyone to pay to any individual any such royalty or rents or any consideration therefor whatsoever; and all royalties and rents hereafter payable to the tribe shall be paid, under such rules and regulations as may be prescribed by the Secretary of the Interior, into the Treasury of the United States to the credit of the tribe to which they belong: *Prorided*, That where any citizen shall be in possession of only such amount of agricultural or grazing lands as would be his just and reasonable share of the lands of his nation or tribe, and that to which his wife and minor children are entitled, he may continue to use the same or receive the rents thereon until allotment has been made to him: *Prorided further*, That nothing herein contained shall impair the rights of any member of a tribe to dispose of any timber contained in his, her, or their allotment."

Rules and regulations prescribed by the Secretary of the Interior under the general provisions of the act of Congress approved June 28, 1898 (30 Stats., 495), to govern miscellaneous matters in the Indian Territory.

Under the general provisions of the act of June 28, 1898 (30 Stats., 495), the Secretary of the Interior is required to prescribe rules and regulations to govern the leasing of lands for mineral purposes, the collection of royalties, rents, and other revenues of the nations within said Territory, and the disbursement of moneys belonging to such nations; therefore the following rules and regulations shall apply in all cases not provided for by specific agreements heretofore ratified by Congress and the nations interested, or that may be hereafter ratified by such nations, and regulations heretofore or hereafter prescribed under such agreements:

MINERAL LEASES.

1. That leases under section 13 of the said act shall be entered into with the Secretary of the Interior and on blank forms prescribed by him, and no lease otherwise made shall be valid or have any effect whatever to vest in the lessee any right or interest either at law or in equity.

2. All such leases shall be in quadruplicate, and shall contain a clear and full description by legal subdivisions of the tract or tracts of land covered thereby, not to exceed six hundred and forty acres, which legal subdivisions must be contiguous to each other.

3. Minimum royalties shall be required of all lessees as follows, the right being reserved, however, by the Secretary of the Interior in special cases to either reduce or advance the royalty on coal, asphalt, or other minerals, on the presentation of facts which, in his opinion, make it to the interest of the nation of Indians within which such coal, asphalt, or other minerals may be located, but such advancement or reduction of royalty in a particular case shall not operate in any way to modify the general provisions of these regulations fixing the minimum royalty as herein provided, viz:

(*a*) On coal, ten cents per ton for each and every ton of screened coal produced weighing two thousand pounds.

(*b*) On asphalt, sixty cents per ton for each and every ton produced weighing two thousand pounds.

(*c*) On gilsonite, elaterite, and other like mineral substances the royalty shall be fixed according to the comparative market value of the same to the value of asphalt.

(*d*) On oil, ten per centum of the value of all oil produced, the royalty to be ascertained on the value of the oil in its crude state.

(*e*) On all other minerals—such as gold, silver, iron, and the like—as follows, sampling charges to be first deducted: On all net smelter returns of ore of fifty dollars ($50) per ton and under, a royalty of ten (10) per cent; on all net smelter returns of ore over fifty dollars ($50) per ton and less than one hundred and fifty dollars ($150) per ton, a royalty of fifteen (15) per cent; on all net smelter returns

April 13, 1899.—I again inspected the Otero mine. I measured 15,780 cubic feet of air entering the mine per minute. I then inspected the workings of the mine and found them in good condition. On this date the mine was not being operated.

May 26, 1899.—I again inspected the Otero mine. I measured 22,150 cubic feet of air entering the mine per minute, and measured 22,750 cubic feet of air returning per minute. I then inspected the workings of the mine and found them well timbered and in good condition. On this date the mine was not being operated.

THATCHER MINE.

[Alex. Bowie, general manager; John Stewart, superintendent; James W. Bowie, mining engineer.]

This is a new mine located about 3 miles in an easterly direction from the town of Gallup, Bernalillo County, N. Mex. Owned and operated by the Caledonian Coal Company, and commenced to ship coal on January 1, 1899. Kind of coal, lignite; thickness of vein, average, 4 feet and 6 inches; total output, January 1 to June 30, 1899, 11,311 tons; estimated value of output, $16,967; depth of slope, 1,100 feet; value of improvements, $25,000; average number of men employed inside, 26; average number of men employed outside, 6; number of boys employed inside, 1; number of days mine was operated, 117; number of tons of coal used at mine, 150; where coal is marketed, Santa Fe Pacific Railroad, Santa Fe, Prescott and Phœnix Railroad, and California.

This mine is situated on a spur about 2 miles in length, being an extension of the spur on which the Otero mine is situated, and is connected with the Santa Fe Pacific Railroad near the station of Gallup. This mine is ventilated by an air shaft, and is operated by a slope 1,100 feet in length. The coal is hoisted by steam power, and has a capacity of about 300 tons per day.

RECORD OF INSPECTION.

January 7, 1899.—On this date I visited and inspected the mine known as the Thatcher mine. I measured 3,840 cubic feet of air entering the mine per minute, and measured 3,915 cubic feet of air returning per minute. I found the workings of this mine well ventilated and in good condition.

April 8, 1899.—I again inspected the Thatcher mine. I measured 5,040 cubic feet of air entering the mine per minute, and measured 5,460 cubic feet of air returning per minute. I found the workings of the mine in good condition.

GALLUP MINE.

[W. M. Weaver, general manager; Hugh McGinn, superintendent; P. O'Neil, pit boss.]

This mine is located about 3 miles northwest of the town of Gallup, Bernalillo County, N. Mex. Owned and operated by the Crescent Coal Company, and is situated on a spur about three miles in length, connecting with the Santa Fe Pacific Railroad near Gallup Station. Kind of coal, lignite; thickness of vein, 6 feet; total output, fiscal year ended June 30, 1899, 151,525 tons; estimated value of output, $212,000; depth of slope, 3,000 feet; value of improvements, this year, $4,117 43; average number of men employed inside, 250; average number of men employed outside, 20; average number of boys employed inside, 5; number of days mine was operated, 241; number of tons used at mine, 903; where coal is marketed, New Mexico, Arizona, Texas, California, and Old Mexico.

RECORD OF INSPECTION.

September 28, 1898.—On this date I inspected the mine known as the Gallup mine. The fan was running 103 revolutions per minute, and I measured 43,740 cubic feet of air entering the mine per minute, and measured 44,500 cubic feet of air returning per minute through the return air course. I found the miners working too far in advance of the air in the first right cross entry, and ordered the superintendent to have a crosscut (air way) driven from the face of the entry to the air course. The superintendent had the work of driving the crosscut commenced at once. Since my previous visit to this mine a new air shaft has been sunk, which connects with the face of No. 15 left entry and has greatly improved the ventilation throughout the workings on said entry.

November 18, 1898.—I again inspected the machinery belonging to the Gallup mine. I found one of the boilers in bad condition, and so informed the superintendent. I was informed by the superintendent that a new boiler had just arrived and men would be put to work to remove the old boiler, and the new one would be put in as soon as possible.

November 19, 1898.—I inspected the underground workings of the Gallup mine. The fan was running 60 revolutions per minute, and I measured 29,750 cubic feet of

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DISBURSEMENTS.

16. The salaries of all officers of any tribe or nation in the Indian Territory to which these regulations are applicable, provided for by the laws of such tribe or nation, shall be paid by the United States Indian agent, under the supervision and direction of the United States Indian inspector for the Indian Territory, and upon authority specifically given therefor by the Secretary of the Interior, out of moneys in the hands of the Government of the United States subject to disbursement therefor under the direction of the Secretary of the Interior, belonging to such tribe or nation. And for the purposes of this regulation all such officers shall be required to file with the said United States Indian agent, in duplicate, a claim for salary, setting forth the amount claimed to be due, the time within which the services for which compensation is claimed were rendered, that the services were actually performed by the claimant, the tribal law under which said services are alleged to have been rendered, and evidence that the party claiming compensation as an officer of any such tribe or tribes is in fact such officer (such as the original appointment or the election of such person to fill the position claimed to be occupied by him), and said claim shall be duly verified by the claimant.

17. All salaries of teachers employed in the public schools of any tribe or nation to which these regulations apply, payable out of the funds of such tribe or nation, shall be paid by the United States Indian agent under the supervision and direction of the United States Indian inspector for the Indian Territory, and by authority of the Secretary of the Interior, out of any moneys of the tribe or nation available for the purpose, and all such teachers shall be required to file with the United States Indian agent, in duplicate, a claim under oath for the amount of salary, furnishing the information and evidence required in the above regulation for the payment of salaries of officers of such tribe or nation.

18. Before any salaries of tribal officials or teachers, as above provided, shall be paid by the United States Indian agent, the claims of such officers and teachers shall first be transmitted by the agent through the United States Indian inspector for the Indian Territory, with a full and detailed report and all evidence filed therein, to the Commissioner of Indian Affairs, to be submitted to the Secretary of the Interior for his action thereon, and upon approval thereof the United States Indian agent shall make requisition for the money necessary to pay the salaries authorized to be paid, and shall pay the same, rendering account in the usual manner therefor.

SCHOOLS.

19. For the purpose of the proper supervision of the schools of any tribe or nation to which these regulations apply there shall be appointed by the Secretary of the Interior a capable, competent, and discreet person, who shall have had experience in educational work, to be designated as "supervisor of schools in the Indian Territory," whose duty it shall be, subject to the direction and supervision of the United States Indian inspector, to visit from time to time, examine into and supervise the conduct of schools of such tribe or nation, and to report fully and in detail, as often as may be desirable (at least once in every month), to the Commissioner of Indian Affairs, through the United States Indian inspector, the condition of each school in the Territory, the methods of instruction employed, the efficiency of the teachers engaged, and shall make such recommendations concerning the same as he shall deem best.

20. The compensation of such supervisor of Indian schools for the Indian Territory shall be $1,500 per annum, with commutation of subsistence at the rate of $3 per diem, when absent from home in the discharge of his official duties, and all actual and necessary expenses for transportation, payable out of the general appropriation for Indian schools.

21. Should it appear from the report of the supervisor of Indian schools for the Indian Territory at any time that any teacher of any school is incompetent to properly instruct the pupils of such school, or is of immoral character, or that for any reason the continuance of such teacher in the service would be to the detriment thereof, then it shall be the duty of the Commissioner of Indian Affairs to bring the matter to the attention of the Secretary of the Interior for his consideration and action, the purpose of this regulation being to provide efficient, competent, and moral instructors for the youth of the Indian Territory, in order to fit them to become good, useful members of society.

22. The right to change, modify, or amend these regulations is reserved.

CORNELIUS N. BLISS, *Secretary.*

DEPARTMENT OF THE INTERIOR,
Washington, November 4, 1898.

air entering the mine per minute, and measured 29,960 cubic feet of air returning per minute through the return air course. I found the mine well ventilated, and found the workings of the mine well timbered and in good condition.

January 10, 1899.—I again inspected the Gallup mine. The fan was running 85 revolutions per minute, and I measured 46,200 cubic feet of air entering the mine per minute and measured 47,800 cubic feet of air returning per minute. I found the ventilation good throughout the workings of the mine, and found the workings well timbered and in good condition.

April 12, 1899.—I again inspected the Gallup mine. I measured 27,400 cubic feet of air entering the mine per minute. I then inspected the workings of the mine and found them in good condition. The mine was not being operated on this date.

May 25, 1899.—I again inspected the Gallup mine. The fan was running 90 revolutions per minute, and I measured 33,000 cubic feet of air entering the mine per minute. I then inspected No. 11 right entry, No. 1 straight entry, No. 1 left entry, and No. 1 cross entry. I found the air measurements to be as follows: Cubic feet of air traveling per minute in No. 1 straight entry, 7,400; cubic feet of air traveling per minute at face of No. 1 straight entry, 1,400; No. 1 cross entry, 5,080 cubic feet; intake to No. 1 left entry, 10,500 cubic feet; last crosscut near face of No. 1 left entry, 1,200 cubic feet. I found considerable coal dust in the entries and ordered it loaded into pit cars and hauled out of the mine.

May 30, 1899.—I inspected the machinery belonging to the Gallup mine and found the same in good condition.

SUNSHINE MINE.

[Hugh McGinn, superintendent; W. M. Weaver, general manager.]

This mine is located about 1½ miles north of the town of Gallup, Bernalillo County, N. Mex. Owned and operated by the Crescent Coal Company. Kind of coal, lignite; thickness of vein, 5 feet; total output, fiscal year ended June 30, 1899, 27,723 tons; estimated value of output, $39,000; depth of slope, 2,100 feet; value of improvements this year, not given; average number of men employed inside, 120; average number of men employed outside, 5; number of days mine was worked during year, 154; where coal is marketed, New Mexico, California, and Arizona; number of tons used at mine, 709.

This mine is located on a railroad spur 1½ miles in length, connecting with the Santa Fe Pacific Railway near Gallup Station. Is operated by a slope and ventilated by a 12-foot Crawford & McCrimmon fan. This mine has not been operated since February 15, 1899.

RECORD OF INSPECTION.

September 27, 1898.—On this date I inspected the mine known as the Sunshine mine. The fan was running 85 revolutions per minute, and I measured 23,520 cubic feet of air entering the mine per minute and measured 24,240 cubic feet of air returning per minute. At the time of my visit to the mine a shaft had been raised from the Sunshine vein of coal to the Crown Point vein, a distance of 33 feet, making connection between the two veins. A good ladder way was placed in the shaft, thus making a good traveling way for the miners. I found the workings of the mine well ventilated and in good condition.

November 14, 1898.—I again inspected the mine known as the Sunshine mine. The fan was running 80 revolutions per minute, and I measured 28,800 cubic feet of air entering the mine per minute and measured 30,240 cubic feet of air returning through the return air course. I found the miners in Nos. 3 and 4 rooms on the north entry working in advance of the air, and ordered the pit boss to have a crosscut (air way) driven between the rooms, so as to give the air a chance to circulate up to the face of the room and give the miners good fresh air in which to work; otherwise I found the workings of the mine in good condition.

January 9, 1899.—I again inspected the Sunshine mine. The fan was running 72 revolutions per minute, and I measured 25,600 cubic feet of air entering the mine per minute and measured 27,840 cubic feet of air returning per minute. I then inspected the workings of the mine, and found the ventilation good throughout the workings. I found a set of timbers in the slope broken and ordered them to put in a new set; otherwise the mine was in good condition.

April 15, 1899.—I again inspected the Sunshine mine. I inspected the air courses and hauling roads and found the same in good condition. On this date the mine was not being operated, and I was informed by the superintendent that the mine was closed down on February 15. I then informed the superintendent to keep the traveling way open between the Sunshine and Crown Point mines, so that in case that anything should happen to the Crown Point shaft, the miners could come through the shaft connecting the Sunshine and Crown Point mines and come out on the Sunshine slope.

CROWN POINT MINE.

[Hugh McGinn, superintendent; W. M. Weaver, general manager.]

This mine is located about 3 miles in a northerly direction from the town of Gallup, Bernalillo County, N. Mex. Owned and operated by the Crescent Coal Company. Kind of coal, lignite; thickness of vein, 3 feet 6 inches to 5 feet; total output, fiscal year ended June 30, 1899, 45,490 tons; estimated value of output, $63,700; depth of shaft, 225; value of improvements this year, not given; average number of men employed inside, 110; average number of men employed outside, 10; average number of boys employed inside, 3; number of days mine worked this year, 239; where coal is marketed, New Mexico, Arizona, and California.

This mine is located on a railroad spur 3 miles in length, connecting with the Santa Fe Pacific Railway near Gallup Station. Is operated by a double compartment shaft 225 feet deep; capacity, about 250 tons per day; ventilated by a 12-foot Crawford & McCrimmon fan and an air shaft.

RECORD OF INSPECTION.

September 24, 1898.—On this date I inspected the machinery belonging to the Crown Point mine. I found the hoisting engine, boilers, ropes, and cages in good condition. On this date the mine was not being operated.

November 17, 1898.—I again inspected the Crown Point mine. The fan was running 80 revolutions per minute, and I measured 15,510 cubic feet of air entering the mine per minute, and measured 16,200 cubic feet of air returning per minute. I found the ventilation very good throughout the workings of the mine. I found the traveling road leading to the escape shaft in bad condition, caused by rock falling from the roof of the roadway, and I ordered the pit boss to have the traveling road cleared of all falls of rock and to keep said traveling road in good condition at all times. The pit boss informed me that the work would be commenced at once and continued until the falls of rock were all removed; otherwise I found the mine in good condition.

January 11, 1899.—I again inspected the Crown Point mine. The fan was running 70 revolutions per minute, and I measured 16,000 cubic feet of air entering the mine per minute, and measured 16,800 cubic feet of air returning per minute. I found very little air traveling at the working faces of No. 7 and 8 entries, and ordered the pit boss to have all stoppings along the line of said entries made air-tight, so as to force the air up to the face of the entries. The pit boss informed me that he would have the work commenced on that night and would continue the work until the air was forced up to the face of the entries.

April 14, 1899.—I again inspected the Crown Point mine. The fan was running 60 revolutions per minute, and I measured 18,400 cubic feet of air entering the mine per minute. I then inspected the workings of the mine and found the roadway leading to the escape shaft in bad condition, and ordered said roadway cleared of all falls of rock. The pit boss informed me that the work would be commenced at once. The mine was not being operated on this date.

May 27, 1899.—I again inspected the Crown Point mine. The fan was running 60 revolutions per minute, and I measured 7,150 cubic feet of air entering the mine per minute, and measured 7,650 cubic feet of air returning per minute. I then inspected the workings of the mine, and found some water in the main air course and ordered it pumped out. I also ordered the fan speeded up to 80 revolutions per minute.

CATALPA MINE.

[Hugh McGinn, superintendent; W M. Weaver, general manager.]

This mine is located about 3 miles in a southeasterly direction from the town of Gallup, Bernalillo County, N. Mex. Owned and operated by the Crescent Coal Company. Kind of coal, lignite; thickness of vein, 6 feet; total output, fiscal year ended June 30, 1899, 58,061 tons; estimated value of output, $81,280; depth of slope, 1,000 feet; value of improvements (total), $10,039.84; average number of men employed inside, 100; average number of men employed outside, 5; number of days mine was operated, 236; where coal is marketed, New Mexico, Arizona, and California.

This mine is situated on a railroad spur, 3 miles in length, connecting with the Santa Fe Pacific Main Line near Gallup Station, and with the development work done last year has a capacity of about 700 tons per day, and is ventilated by a furnace. This mine was operated 236 days this year as against 46 days last year.

RECORD OF INSPECTION.

September 23, 1898.—On this date I inspected the mine known as the Catalpa mine. I measured 8,400 cubic feet of air entering the mine per minute and measured 8,640

Sworn to and subscribed before me this —— day of ——, 189—.

[SEAL.] ——— ———,

——— ———.

——— *of* ———, *county of* ———, *ss:*

I, ——— ———, do hereby certify that ———, who administered the above oath, was at the time of doing so a ——— in and for said ———, duly qualified to act as such and to administer oaths in such cases, and that I believe his signature as above written is genuine.

In testimony whereof I have hereto set my hand and affixed the seal of the ——— this —— day of ——— one thousand eight hundred and ninety ——.

——— ———,

——— ———.

[Circular No. 3.]

DEPARTMENT OF THE INTERIOR,
OFFICE OF UNITED STATES INDIAN INSPECTOR FOR INDIAN TERRITORY,
Muscogee, Ind. T., June 1, 1899.

The following modifications of the rules and regulations prescribed by the Secretary of the Interior, dated November 4, 1898, concerning the leasing of mineral lands in the Creek and Cherokee nations, of the Indian Territory, are promulgated for the information of all concerned, the same being an extract from a letter addressed to me from the honorable Secretary under date of May 22, 1899:

"It is not and will not be the policy of the Department to allow single individuals or corporations to include immense tracts of land in a large number of separate leases, although said parties may be willing to pay the advanced royalty prescribed for each individual lease. On the other hand, it is not the purpose of the Department to deprive any person or corporation of the benefits to which such person may be entitled where the person has in good faith entered upon land under the tribal customs and laws and invested money in improvements and in the development of the mineral resources, and where the efforts of such person or corporation have resulted in the production of oil, coal, asphalt, or other minerals in commercial quantities. No fixed rule, however, can be established, but each case must rest upon its own individual merits. In the case of mineral leases, as in the case of acquiring title to the public lands of the United States, good faith must be the test upon which every application shall be made, and in addition to the requirements in said regulations, paragraphs 10 and 11, each applicant will be required to file with his application with the United States Indian inspector a plat showing the land applied for, the exact location and extent of the improvements made, and he must also state the value of the improvements, the amount of mineral that has been mined, and whether there is any adverse occupant or claim to the land; and he should also refer to and properly describe the tribal lease under which he has been acting, giving the time when said lease will expire. Each contract of lease will also contain a provision that it shall continue for a term of fifteen years, unless, by duly ratified agreement with the Indians or by law of Congress, the allotees shall become entitled to the mineral in allotments, and in that event the lease shall expire on the final completion of individual allotments or the issuance of patents by the proper authorities to the allottees for the lands included in their allotments.

"In view of the earnest protests made by the authorities of the Creek and Cherokee nations, no applications for mineral leases will be received from parties who have not entered upon the lands and made improvements thereon for the purpose of developing the mineral in said lands under the tribal usages or customs, or under the provisions of said act of June 28, 1898, and said regulations of November 4, 1898. Said regulations are hereby amended in accordance with the views above indicated.

"You will give notice by publication of the change in said regulations, as above indicated, and that persons or corporations claiming preference rights under the provisions of section 13 of said act and the regulations made thereunder, must file with the United States Indian inspector for the Indian Territory separate applications for mining leases in accordance with the provisions of said regulations as herein amended, within thirty days from the date of said notice, and you will, in addition, send a copy of said notice by mail to any person or corporation that has heretofore filed with said inspector a mining application, claiming a preference right by reason of improvements, made under said section 13 and the regulations thereunder."

Section 13 of the act of Congress approved June 28, 1898, and the regulations prescribed thereunder, under date of November 4, 1898, above referred to, provide that each lease shall cover no more than 640 acres, which must be described by legal subdivisions according to the United States survey, and which legal subdivisions must be contiguous to each other. Applications for leases to be filed with the

United States Indian inspector for the Indian Territory, and every application to be accompanied by a duly certified check upon the United States depository at St. Louis, Missouri, or upon some solvent national bank of the United States, for one hundred dollars, payable to the order of the United States Indian agent at the Union Agency, Indian Territory, in payment of advanced royalty on the lease for one year.

J. GEORGE WRIGHT,
United States Indian Inspector for the Indian Territory.

Following is a copy of the act of Congress for the protection of the lives of the miners in the Territories:

[Public—No. 165.]

AN ACT for the protection of the lives of miners in the Territories.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in each organized and unorganized Territory of the United States wherein are located coal mines, the aggregate annual output of which shall be in excess of one thousand tons per annum, the President shall appoint a mine inspector, who shall hold office until his successor is appointed and qualified. Such inspector shall, before entering upon the discharge of his duties, give bond to the United States in the sum of two thousand dollars, conditioned for the faithful discharge of his duties.

SEC. 2. That no person shall be eligible for appointment as mine inspector under section one of this act who is not either a practical miner or mining engineer and who has not been a resident for at least six months in the Territory for which he shall be appointed; and no person who shall act as land agent, manager, or agent of any mine, or as mining engineer, or be interested in operating any mine in such Territory, shall be at the same time an inspector under the provisions of this act.

SEC. 3. That it shall be the duty of the mine inspector provided for in this act to make careful and thorough inspection of each coal mine operated in such Territory, and to report at least annually upon the condition of each coal mine in said Territory, with reference to the appliances for safety of the miners, the number of air or ventilating shafts, the number of shafts or slopes for ingress or egress, the character and condition of the machinery for ventilating such mines, and the quantity of air supplied to the same. Such reports shall be made to the governor of the Territory in which such mines are located and a duplicate thereof forwarded to the Secretary of the Interior, and in the case of an unorganized Territory directly to the Secretary of the Interior.

SEC. 4. That in case the said mine inspector shall report that any coal mine is not properly constructed or not furnished with reasonable and proper machinery and appliances for the safety of the miners and other employees, it shall be the duty of the governor of such organized Territory, it shall be the duty of the Secretary of the Interior, to give notice to the owners or managers of said coal mine that the said mine is unsafe, and notifying them in what particular the same is unsafe, and requiring them to furnish and provide such additional machinery, slopes, entries, means of escape, ventilation, or other appliances necessary to the safety of the miners and other employees within a period to be in said notice named; and if the same be not furnished as required in such notice it shall be unlawful after the time fixed in such notice for the said owners or managers to operate said mine.

SEC. 5. That in all coal mines in the Territories of the United States the owners or managers shall provide at least two shafts, slopes, or other outlets, separated by natural strata of not less than one hundred and fifty feet in breadth, by which shafts, slopes, or outlets distinct means of ingress and egress shall always be available to the persons employed in said mine. And in case of the failure of any coal mine to be so provided it shall be the duty of the mine inspector to make report of such fact and thereupon notice shall issue, as provided in section four of this act, and with the same force and effect.

SEC. 6. That the owners or managers of every coal mine at a depth of one hundred feet or more shall provide an adequate amount of ventilation of not less than fifty-five cubic feet of pure air per second, or thirty-three hundred cubic feet per minute, for every fifty men at work in said mine, and in like proportion for a greater number, which air shall, by proper appliances and machinery, be forced through such mine to the face of each and every working place so as to dilute and render harmless and expel therefrom the noxious or poisonous gases; and all workings shall be kept clear of standing gas.

SEC. 7. That any mine owner or manager who shall continue to operate a mine after failure to comply with the requirements of this act, and after the expiration of

the period named in the notice provided for in section four of this act, shall be deemed guilty of a misdemeanor and shall be fined not to exceed five hundred dollars.

SEC. 8. That in no case shall a furnace shaft be used or for the purposes of this act be deemed an escape shaft.

SEC. 9. That escape shafts shall be constructed in compliance with the requirements of this act within six months from the date of the passage hereof, unless the same shall be extended by the mine inspector, and in no case shall said time be extended to exceed one year from the passage of this act.

SEC. 10. That a metal speaking tube from the top to the bottom of the shaft or slope shall be provided in all cases, so that conversation may be carried on through the same.

SEC. 11. That an approved safety catch shall be provided and sufficient cover overhead on every carriage used in lowering or hoisting persons; and the mine inspector shall examine and pass upon the adequacy and safety of all such hoisting apparatus.

SEC. 12. That no child under twelve years of age shall be employed in the underground workings of any mine; and no father or other person shall misrepresent the age of anybody so employed. Any person found guilty of violating the provisions of this section shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined not to exceed one hundred dollars.

SEC. 13. That only experienced and competent and sober men shall be placed in charge of hoisting apparatus or engines; and the maximum number of persons who may ascend or descend upon any cage or hoisting apparatus shall be determined by the mine inspector.

SEC. 14. That it shall be lawful for any inspector to enter and inspect any coal mine in his district and the work and machinery belonging thereto at all reasonable times, but so as not to impede or obstruct the working of the mine, and to make inquiry into the state of the mine works and machinery, and the ventilation and mode of lighting the same, and into all matters and things connected with or relating to the safety of the persons employed in or about the same, and especially to make inquiry whether the provisions of this act are complied with, and the owner or agent is hereby required to furnish means necessary for such entry, inspection, examination, and inquiry, of which the said inspector shall make an entry in the record in his office, noting the time and material circumstances of the inspection.

SEC. 15. That in all cases of fatal accident a full report thereof shall be made by the mine owner or manager to the mine inspector, said report to be in writing and made within ten days after such death shall have occurred.

SEC. 16. That as a cumulative remedy, in case of the failure of any owner or manager of any mine to comply with the requirements contained in the notice of the governor of such Territory or the Secretary of the Interior, given in pursuance of this act, any court of competent jurisdiction, or the judge of such court in vacation, may, on the application of the mine inspector in the name of the United States and supported by the recommendation of the governor of said Territory or of the Secretary of the Interior, issue an injunction restraining the further operation of such mine until such requirements are complied with, and in order to obtain such injunction no bond shall be required.

SEC. 17. That wherever the term "owner or manager" is used in this act the same shall include lessees or other persons controlling the operation of any mine. And in case of violation of the provisions of this act by any corporation, the managing officers and superintendents and other managing agents of such corporation shall be personally liable and shall be punished as provided in act for owners and managers.

SEC. 18. That the mine inspectors provided for in this act shall each receive a salary of two thousand dollars per annum and their actual traveling expenses when engaged in their duties.

SEC. 19. That whenever any organized Territory shall make or has made provision by law for the safe operation of mines within such Territory, and the governor of such Territory shall certify said fact with a copy of the said law to the Secretary of the Interior, then and thereafter the provisions of this act shall no longer be enforced in such organized Territory, but in lieu thereof the statute of such Territory shall be operative in lieu of this act.

Approved, March 3, 1891.

ANNUAL REPORT

OF THE

MINE INSPECTOR FOR THE TERRITORY OF NEW MEXICO.

SILVER CITY, N. MEX., *August 25, 1899.*

SIR: In compliance with section 3 of an act of Congress approved March 3, 1891, entitled "An act for the protection of the lives of miners in the Territories," I herewith beg leave to submit the seventh annual report of this office, covering the fiscal year ended June 30, 1899.

JOHN W. FLEMING,
United States Mine Inspector for the Territory of New Mexico.

The SECRETARY OF THE INTERIOR,
Washington, D. C.

BERNALILLO COUNTY.

OTERO MINE.

[Alex. Bowie, general manager; John Stewart, superintendent; James W. Bowie, mining engineer.]

Located about 2½ miles in an easterly direction from the town of Gallup, Bernalillo County, N. Mex. Owned and operated by the Caledonian Coal Company. Kind of coal, lignite; thickness of vein, average, 4 feet and 6 inches; total output, fiscal year, 96,473 tons; estimated value of output, $144,709.50; depth of slope, 1,400 feet; total value of improvements, $45,000; average number of men employed inside, 139; average number of men employed outside, 31; average number of boys employed inside, 2; number of days mine was operated, 233; number of tons used at mine, 1,500; where coal is marketed, Santa Fe Pacific Railroad, Santa Fe, Prescott and Phœnix Railroad, and California.

This mine is situated on a spur about 1 mile in length, connecting with the Santa Fe Pacific Railroad near Gallup station; is operated by a slope 1,400 feet in length, and has a capacity of about 700 tons per day. This mine is ventilated by an air shaft and furnace.

RECORD OF INSPECTION.

September 26, 1898.—On this date I inspected the underground workings of the Otero mine. I measured 12,960 cubic feet of air entering the mine per minute, and measured 13,750 cubic feet of air returning per minute. I found the ventilation good throughout the workings of the mine, and found the workings of the mine well timbered and in good condition.

November 16, 1898.—I again inspected the Otero mine. I measured 17,600 cubic feet of air entering the mine per minute, and measured 18,360 cubic feet of air returning per minute through the return air course. I found the ventilation very good throughout the workings, and found the working places well timbered and in good condition.

January 12, 1899.—I again inspected the Otero mine. I measured 11,670 cubic feet of air entering the mine per minute, and measured 12,960 cubic feet of air returning per minute. I found the ventilation good throughout the workings of the mine, and the workings well timbered and in good condition.

April 13, 1899.—I again inspected the Otero mine. I measured 15,780 cubic feet of air entering the mine per minute. I then inspected the workings of the mine and found them in good condition. On this date the mine was not being operated.

May 26, 1899.—I again inspected the Otero mine. I measured 22,150 cubic feet of air entering the mine per minute, and measured 22,750 cubic feet of air returning per minute. I then inspected the workings of the mine and found them well timbered and in good condition. On this date the mine was not being operated.

THATCHER MINE.

[Alex. Bowie, general manager; John Stewart, superintendent; James W. Bowie, mining engineer.]

This is a new mine located about 3 miles in an easterly direction from the town of Gallup, Bernalillo County, N. Mex. Owned and operated by the Caledonian Coal Company, and commenced to ship coal on January 1, 1899. Kind of coal, lignite; thickness of vein, average, 4 feet and 6 inches; total output, January 1 to June 30, 1899, 11,311 tons; estimated value of output, $16,967; depth of slope, 1,100 feet; value of improvements, $25,000; average number of men employed inside, 26; average number of men employed outside, 6; number of boys employed inside, 1; number of days mine was operated, 117; number of tons of coal used at mine, 150; where coal is marketed, Santa Fe Pacific Railroad, Santa Fe, Prescott and Phœnix Railroad, and California.

This mine is situated on a spur about 2 miles in length, being an extension of the spur on which the Otero mine is situated, and is connected with the Santa Fe Pacific Railroad near the station of Gallup. This mine is ventilated by an air shaft, and is operated by a slope 1,100 feet in length. The coal is hoisted by steam power, and has a capacity of about 300 tons per day.

RECORD OF INSPECTION.

January 7, 1899.—On this date I visited and inspected the mine known as the Thatcher mine. I measured 3,840 cubic feet of air entering the mine per minute, and measured 3,915 cubic feet of air returning per minute. I found the workings of this mine well ventilated and in good condition.

April 8, 1899.—I again inspected the Thatcher mine. I measured 5,040 cubic feet of air entering the mine per minute, and measured 5,460 cubic feet of air returning per minute. I found the workings of the mine in good condition.

GALLUP MINE.

[W. M. Weaver, general manager; Hugh McGinn, superintendent; P. O'Neil, pit boss.]

This mine is located about 3 miles northwest of the town of Gallup, Bernalillo County, N. Mex. Owned and operated by the Crescent Coal Company, and is situated on a spur about three miles in length, connecting with the Santa Fe Pacific Railroad near Gallup Station. Kind of coal, lignite; thickness of vein, 6 feet; total output, fiscal year ended June 30, 1899, 151,525 tons; estimated value of output, $212,000; depth of slope, 3,000 feet; value of improvements, this year, $4,117 43; average number of men employed inside, 250; average number of men employed outside, 20; average number of boys employed inside, 5; number of days mine was operated, 241; number of tons used at mine, 903; where coal is marketed, New Mexico, Arizona, Texas, California, and Old Mexico.

RECORD OF INSPECTION.

September 28, 1898.—On this date I inspected the mine known as the Gallup mine. The fan was running 103 revolutions per minute, and I measured 43,740 cubic feet of air entering the mine per minute, and measured 44,500 cubic feet of air returning per minute through the return air course. I found the miners working too far in advance of the air in the first right cross entry, and ordered the superintendent to have a crosscut (air way) driven from the face of the entry to the air course. The superintendent had the work of driving the crosscut commenced at once. Since my previous visit to this mine a new air shaft has been sunk, which connects with the face of No. 15 left entry and has greatly improved the ventilation throughout the workings on said entry.

November 18, 1898.—I again inspected the machinery belonging to the Gallup mine. I found one of the boilers in bad condition, and so informed the superintendent. I was informed by the superintendent that a new boiler had just arrived and men would be put to work to remove the old boiler, and the new one would be put in as soon as possible.

November 19, 1898.—I inspected the underground workings of the Gallup mine. The fan was running 60 revolutions per minute, and I measured 29,750 cubic feet of

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air entering the mine per minute, and measured 29,960 cubic feet of air returning per minute through the return air course. I found the mine well ventilated, and found the workings of the mine well timbered and in good condition.

January 10, 1899.—I again inspected the Gallup mine. The fan was running 85 revolutions per minute, and I measured 46,200 cubic feet of air entering the mine per minute and measured 47,800 cubic feet of air returning per minute. I found the ventilation good throughout the workings of the mine, and found the workings well timbered and in good condition.

April 12, 1899.—I again inspected the Gallup mine. I measured 27,400 cubic feet of air entering the mine per minute. I then inspected the workings of the mine and found them in good condition. The mine was not being operated on this date.

May 29, 1899.—I again inspected the Gallup mine. The fan was running 90 revolutions per minute, and I measured 33,000 cubic feet of air entering the mine per minute. I then inspected No. 11 right entry, No. 1 straight entry, No. 1 left entry, and No. 1 cross entry. I found the air measurements to be as follows: Cubic feet of air traveling per minute in No. 1 straight entry, 7,400; cubic feet of air traveling per minute at face of No. 1 straight entry, 1,400; No. 1 cross entry, 5,080 cubic feet; intake to No. 1 left entry, 10,500 cubic feet; last crosscut near face of No. 1 left entry, 1,200 cubic feet. I found considerable coal dust in the entries and ordered it loaded into pit cars and hauled out of the mine.

May 30, 1899.—I inspected the machinery belonging to the Gallup mine and found the same in good condition.

SUNSHINE MINE.

[Hugh McGinn, superintendent; W. M. Weaver, general manager.]

This mine is located about 1½ miles north of the town of Gallup, Bernalillo County, N. Mex. Owned and operated by the Crescent Coal Company. Kind of coal, lignite; thickness of vein, 5 feet; total output, fiscal year ended June 30, 1899, 27,723 tons; estimated value of output, $39,000; depth of slope, 2,100 feet; value of improvements this year, not given; average number of men employed inside, 120; average number of men employed outside, 5; number of days mine was worked during year, 154; where coal is marketed, New Mexico, California, and Arizona; number of tons used at mine, 709.

This mine is located on a railroad spur 1½ miles in length, connecting with the Santa Fe Pacific Railway near Gallup Station. Is operated by a slope and ventilated by a 12-foot Crawford & McCrimmon fan. This mine has not been operated since February 15, 1899.

RECORD OF INSPECTION.

September 27, 1898.—On this date I inspected the mine known as the Sunshine mine. The fan was running 85 revolutions per minute, and I measured 23,520 cubic feet of air entering the mine per minute and measured 24,240 cubic feet of air returning per minute. At the time of my visit to the mine a shaft had been raised from the Sunshine vein of coal to the Crown Point vein, a distance of 33 feet, making connection between the two veins. A good ladder way was placed in the shaft, thus making a good traveling way for the miners. I found the workings of the mine well ventilated and in good condition.

November 14, 1898.—I again inspected the mine known as the Sunshine mine. The fan was running 80 revolutions per minute, and I measured 28,800 cubic feet of air entering the mine per minute and measured 30,240 cubic feet of air returning through the return air course. I found the miners in Nos. 3 and 4 rooms on the north entry working in advance of the air, and ordered the pit boss to have a crosscut (air way) driven between the rooms, so as to give the air a chance to circulate up to the face of the room and give the miners good fresh air in which to work; otherwise I found the workings of the mine in good condition.

January 9, 1899.—I again inspected the Sunshine mine. The fan was running 72 revolutions per minute, and I measured 25,600 cubic feet of air entering the mine per minute and measured 27,840 cubic feet of air returning per minute. I then inspected the workings of the mine, and found the ventilation good throughout the workings. I found a set of timbers in the slope broken and ordered them to put in a new set; otherwise the mine was in good condition.

April 15, 1899.—I again inspected the Sunshine mine. I inspected the air courses and hauling roads and found the same in good condition. On this date the mine was not being operated, and I was informed by the superintendent that the mine was closed down on February 15. I then informed the superintendent to keep the traveling way open between the Sunshine and Crown Point mines, so that in case that anything should happen to the Crown Point shaft, the miners could come through the shaft connecting the Sunshine and Crown Point mines and come out on the Sunshine slope.

CROWN POINT MINE.

[Hugh McGinn, superintendent; W. M. Weaver, general manager.]

This mine is located about 3 miles in a northerly direction from the town of Gallup, Bernalillo County, N. Mex. Owned and operated by the Crescent Coal Company. Kind of coal, lignite; thickness of vein, 3 feet 6 inches to 5 feet; total output, fiscal year ended June 30, 1899, 45,490 tons; estimated value of output, $63,700; depth of shaft, 225; value of improvements this year, not given; average number of men employed inside, 110; average number of men employed outside, 10; average number of boys employed inside, 3; number of days mine worked this year, 239; where coal is marketed, New Mexico, Arizona, and California.

This mine is located on a railroad spur 3 miles in length, connecting with the Santa Fe Pacific Railway near Gallup Station. Is operated by a double compartment shaft 225 feet deep; capacity, about 250 tons per day; ventilated by a 12-foot Crawford & McCrimmon fan and an air shaft.

RECORD OF INSPECTION.

September 24, 1898.—On this date I inspected the machinery belonging to the Crown Point mine. I found the hoisting engine, boilers, ropes, and cages in good condition. On this date the mine was not being operated.

November 17, 1898.—I again inspected the Crown Point mine. The fan was running 80 revolutions per minute, and I measured 15,510 cubic feet of air entering the mine per minute, and measured 16,200 cubic feet of air returning per minute. I found the ventilation very good throughout the workings of the mine. I found the traveling road leading to the escape shaft in bad condition, caused by rock falling from the roof of the roadway, and I ordered the pit boss to have the traveling road cleared of all falls of rock and to keep said traveling road in good condition at all times. The pit boss informed me that the work would be commenced at once and continued until the falls of rock were all removed; otherwise I found the mine in good condition.

January 11, 1899.—I again inspected the Crown Point mine. The fan was running 70 revolutions per minute, and I measured 16,000 cubic feet of air entering the mine per minute, and measured 16,800 cubic feet of air returning per minute. I found very little air traveling at the working faces of No. 7 and 8 entries, and ordered the pit boss to have all stoppings along the line of said entries made air-tight, so as to force the air up to the face of the entries. The pit boss informed me that he would have the work commenced on that night and would continue the work until the air was forced up to the face of the entries.

April 14, 1899.—I again inspected the Crown Point mine. The fan was running 60 revolutions per minute, and I measured 18,400 cubic feet of air entering the mine per minute. I then inspected the workings of the mine and found the roadway leading to the escape shaft in bad condition, and ordered said roadway cleared of all falls of rock. The pit boss informed me that the work would be commenced at once. The mine was not being operated on this date.

May 27, 1899.—I again inspected the Crown Point mine. The fan was running 60 revolutions per minute, and I measured 7,150 cubic feet of air entering the mine per minute, and measured 7,650 cubic feet of air returning per minute. I then inspected the workings of the mine, and found some water in the main air course and ordered it pumped out. I also ordered the fan speeded up to 80 revolutions per minute.

CATALPA MINE.

[Hugh McGinn, superintendent; W. M. Weaver, general manager.]

This mine is located about 3 miles in a southeasterly direction from the town of Gallup, Bernalillo County, N. Mex. Owned and operated by the Crescent Coal Company. Kind of coal, lignite; thickness of vein, 6 feet; total output, fiscal year ended June 30, 1899, 58,061 tons; estimated value of output, $81,280; depth of slope, 1,000 feet; value of improvements (total), $10,039.84; average number of men employed inside, 100; average number of men employed outside, 5; number of days mine was operated, 236; where coal is marketed, New Mexico, Arizona, and California.

This mine is situated on a railroad spur, 3 miles in length, connecting with the Santa Fe Pacific Main Line near Gallup Station, and with the development work done last year has a capacity of about 700 tons per day, and is ventilated by a furnace. This mine was operated 236 days this year as against 46 days last year.

RECORD OF INSPECTION.

September 23, 1898.—On this date I inspected the mine known as the Catalpa mine. I measured 8,400 cubic feet of air entering the mine per minute and measured 8,640

cubic feet of air returning per minute. I found the workings of the mine well ventilated and found the mine in good condition.

November 15, 1898.—I again inspected the Catalpa mine. I measured 10,150 cubic feet of air entering the mine per minute and measured 11,520 cubic feet of air returning per minute. I found the ventilation good throughout the workings of the mine and found the workings of the mine well timbered and in good condition.

January 5, 1899.—I again inspected the Catalpa mine. I measured 8,910 cubic feet of air entering the mine per minute and measured 9,600 cubic feet of air returning per minute. I then inspected the workings of the mine and found the miners in the first right entry working too far in advance of the air and ordered a crosscut (air way) driven from the face of the entry to the main air course. The pit boss informed me that the work would be commenced at once.

April 10, 1899.—I again inspected the Catalpa mine. I measured 7,980 cubic feet of air entering the mine per minute. I then inspected the workings of the mine and found the workings in good condition. I found very few props on hand at the mine and ordered the pit boss to keep plenty of props in readiness for the miners.

May 25, 1899.—I again inspected the Catalpa mine. I measured 6,300 cubic feet of air entering the mine per minute and measured 6,730 cubic feet of air returning per minute. I found the ventilation good throughout the workings of the mine. I found some loose rock in the roof of the main slope and ordered it taken down and the place timbered. Otherwise I found the mine in good condition.

The Gallup, Sunshine, Crown Point, and Catalpa mines are all owned and operated by the Crescent Coal Company, and the total number of tons produced by the said four mines during the fiscal year ended June 30, 1899, is 282,799; the total estimated value of this output is $395,980. At the Crown Point and Catalpa mines slack is used for steam purposes, and at the Gallup and Sunshine mines 1,612 tons of coal was used during the fiscal year for steam purposes. The workings of the Crescent Coal Company's mines are free from fire damp; the coal is a soft lignite, good for steam and domestic purposes.

W. A. CLARK COAL MINE.

[W. L. Bretherton agent.]

This mine is located about 5 miles west of the town of Gallup, Bernalillo County, N. Mex. Owned and operated by W. A. Clark. Kind of coal, lignite; thickness of vein, 5 to 7 feet; total ouput, fiscal year ended June 30, 1899, 46,986 tons; estimated value of output, $73,158.62; depth of slope, 1,500 feet; value of improvements, not given; average number of men employed inside, 60; average number of men employed outside, 30; number of days mine was operated, 270; number of tons used at mine, 800; where coal is marketed, Arizona and California.

This mine is situated on a spur connecting with the Santa Fe Pacific Railway, about 4 miles west of Gallup Station. Is operated by a slope 1,500 feet in length and has a capacity of about 500 tons per day. This property consists of 1,280 acres of coal land, which carries several seams of coal, only one seam being worked at present. The workings are dry and free from gas or fire damp. The coal is a soft lignite, good for steam and domestic purposes.

MACHINERY AND EQUIPMENTS.

This mine is equipped with two 100-horsepower boilers, one 150-horsepower engine, and one 25-horsepower engine, 2 electric Westinghouse generators, furnishing a 250-volt current; 1 No. 6 Connerville blower to carry off coal slack, 1 electric and 1 steam deep-well pump, to furnish the necessary water for the town of Clarkville, located at the mines, and for steam use. The mining is done by 2 electric undercutting machines, which cut 5 and 6 feet deep, and 1 rib-shearing machine, made by the Link-Belt Machinery Company; also 1 Morgan-Gardiner electric drill for shooting coal down.

Haulage is done, first, by horses entirely, and by a link-belt 10-ton electric motor, which hauls out on the tipple over a 5 per cent grade. The tipple is the latest Mitchell patent automatic dumper. The pit scales are 10 feet long, large and strong, for pit cars of Eastern make. This mine is equipped with shaking screens, which are used for assorting the coal into 4 different sizes, as desired, and for thoroughly cleaning out all slack.

VENTILATION.

This mine is ventilated by various air shafts raised through from the vein of coal to the surface, which so far has proved very successful.

IMPROVEMENTS.

The improvements consist of 50 dwellings, mostly built of adobe, and are used for residences, which are occupied by the employees of the company; also, a large power house. The store building is built of brick, being a 2-story building, is large and commodious, with a good, deep basement and contains a general stock of merchandise for the town; also, a large boarding house run by the company for the convenience of its employees. The company is erecting a brick building, which will be supplied with literature and used for a reading room. A large schoolhouse is located in the town, in which school is held during the greater portion of each year, the average attendance being 40 for the last scholastic year.

RECORD OF INSPECTION.

September 22, 1898.—On this date I inspected the mine known as the W. A. Clark mine. I measured 6,720 cubic feet of air entering the mine per minute, and measured 6,840 cubic feet of air returning per minute. I found the mine well ventilated and in excellent condition.

November 12, 1898.—I again inspected the W. A. Clark mine. I measured 7,560 cubic feet of air entering the mine per minute, and measured 7,770 cubic feet of air returning per minute. I found the mine well ventilated and found the workings in good condition.

January 6, 1899.—I again visited the mine known as the W. A. Clark mine. I measured 4,800 cubic feet of air entering the mine per minute, and measured 5,440 cubic feet of air returning per minute. The ventilation and workings of the mine were in good condition.

April 7, 1899.—I again visited and inspected the W. A. Clark mine. I measured 4,320 cubic feet of air entering the mine per minute, and measured 4,680 cubic feet of air returning per minute. The mine was in good condition.

May 24, 1899.—I again inspected the mine known as the W. A. Clark mine. I measured 11,200 cubic feet of air entering the mine per minute, and measured 12,000 cubic feet of air returning per minute. I found the mine well ventilated and in good condition.

STEWART MINE.

[William Stewart, manager.]

This mine is located one-half mile north of the town of Gallup, Bernalillo County, N. Mex.; owned by the Santa Fe Pacific Railway Company, and is operated under lease by William Stewart. Kind of coal, lignite; thickness of vein, 6 feet; total output, fiscal year ended June 30, 1899, 2,000 tons; estimated value of output, $3,000; value of improvements, $2,000; depth of slope, 400 feet; average number of men employed inside, 6; average number of men employed outside, 3; number of days mine worked during year, 200; where coal is marketed, Arizona, California, and New Mexico.

This mine is a new mine, which has been operated in a small way since July 1, 1898. The coal is hauled in wagons to Gallup Station, where it is shipped to points in Arizona, California, and New Mexico, and is also sold to the local trade in the town of Gallup. The mine is ventilated by an air shaft and has a capacity of about 50 tons per day.

RECORD OF INSPECTION.

November 11, 1898.—On this date I visited and inspected the mine known as the Stewart mine. I found the workings of the mine in good condition. At the time of my visit only 6 miners were employed in the mine.

January 14, 1899.—I again visited and inspected the mine known as the Stewart mine. I measured 2,160 cubic feet of air entering the mine per minute, and measured 2,240 cubic feet of air returning per minute. I found the workings of the mine well ventilated and found the mine in good condition.

April 6, 1899.—I again inspected the Stewart mine. I measured 2,100 cubic feet of air entering the mine per minute. I then inspected the underground workings of the mine, found the ventilation good, and found the mine in good condition.

ROCKY CLIFF MINE.

[Stephen Canavan, general manager.]

This mine is located about 2 miles in an easterly direction from the town of Gallup, Bernalillo County, N. Mex. Owned and operated by Stephen Canavan. Kind of coal,

lignite; thickness of vein, 4 feet and 6 inches; total output, fiscal year ended June 30, 1899, 5,000 tons; estimated value of output, $7,500; depth of slope, 900 feet; total value of improvements, $6,000; average number of men employed inside, 8; average number of men employed outside, 2; number of days mine was operated during year, 200; where coal is marketed, California, and Gallup, N. Mex.

This mine is located on a railroad spur connecting with the Santa Fe Pacific Railway, near Gallup Station. The mine is ventilated by a furnace and has a capacity of 150 tons per day.

RECORD OF INSPECTION.

September 29, 1898.—On this date I inspected the mine known as the Rocky Cliff mine. At the time of my visit to the mine there were only five miners employed therein. I inspected the air course and all the underground workings and found the mine in fair working condition.

November 10, 1898.—I again inspected the Rocky Cliff mine. I measured 4,320 cubic feet of air entering the mine per minute, and measured 4,500 cubic feet of air returning per minute. I found the workings of the mine in good condition.

January 4, 1899.—I again inspected the Rocky Cliff mine. I measured 3,000 cubic feet of air entering the mine per minute, and measured 3,255 cubic feet of air returning per minute. I found the workings of the mine in good condition.

April 11, 1899.—I again inspected the Rocky Cliff mine. I measured 2,050 cubic feet of air entering the mine per minute. I then inspected the workings of the mine; found the workings well ventilated and in good condition.

May 23, 1899.—I again inspected the Rocky Cliff mine. I measured 1,750 cubic feet of air entering the mine per minute, and measured 1,925 cubic feet of air returning per minute. I found the workings of the mine in good condition.

LINCOLN COUNTY.

OLD ABE COAL MINE.

This is a new mine located near White Oaks, Lincoln County, N. Mex. Owned and operated by the Old Abe Company, of which John Y. Hewitt is president, William Watson, vice-president; Levin W. Stewart, secretary. Kind of coal, bituminous; thickness of vein, average, 3½ feet; total output, fiscal year ended June 30, 1899, 1,469 tons; estimated value of output, $3,672.50; depth of slope, 250 feet; value of improvements, $1,100; average number of men employed inside, 3; average number of men employed outside, 1; number of days mine was operated, 172; where coal is marketed, at the town of White Oaks, N. Mex.

Work was commenced on this mine on December 19, 1898, and owing to the location of the mine, being a great distance from the railroad and only a few men being employed, I did not deem it necessary to inspect the mine. I received the above report from the secretary of the company.

NEW MEXICO FUEL COMPANY.

[Mines at Gray, N. Mex.; general offices, Alamogordo, N. Mex.]

The coal fields under the management of the New Mexico Fuel Company are situated in Lincoln County, N. Mex., 165 miles from El Paso, Tex., along the line of the El Paso and Northeastern Railroad, which will be completed to the mines on or about October 1. On July 8, 1899, I addressed a letter to W. A. Hawkins, esq., of El Paso, Tex., attorney for the New Mexico Fuel Company, requesting him to forward me a report of the coal mines being opened by the company. In reply to this letter I received the following report from T. L. Welles, superintendent:

GRAY, N. MEX., *July 14, 1899.*

DEAR SIR: Your esteemed favor of the 8th instant to W. A. Hawkins, esq., of El Paso., Tex., has been forwarded to me as superintendent of the New Mexico Fuel Company, which is the title of the company opening the mines referred to.

On April 1 of the current year the company started the Salado Camp, and on April 3 began work on No. 1 slope on the Akers or lower seam of coal. The size of the timbers in this slope are in the clear 8 feet cap, 6 feet 2 inches legs on a 2-inch batter, giving 6 feet clear of tie, with 10 feet at bottom. Gauge of track is 36 inches. The average section of seam so far is 4 feet 6½ inches, of which 7 inches is a fire-clay slate, leaving 3 feet 11½ inches of coal. The slope has been driven a distance of 345 feet from the apex, of which 22 feet is open cut and 140 feet double timbered.

The average pitch of seam is 14 degrees. An air shaft 10 by 12 feet was sunk down 34 feet to the coal, at a distance of 155 feet from the mouth of the slope, and

has been connected with the slope air ways by a larger air passage. The three-entry system is the one in use, the left-hand air way having a large air bridge to connect it with the one on the right, which runs up to the air shaft. At present a small furnace is in use at the bottom of the shaft, and furnishes abundant air at all times. A fan is on the ground ready for use when occasion may require.

The coal is of the coking variety, and shows the following analysis:

Water	0.775
Volatile matter	41.250
Fixed carbon	46.950
Ash	11.025
	100.000
Sulphur	.735

This was from a sample taken from the whole height of the seam.

The latter part of June the company started a pair of 10 by 10 inch friction hoists, which are doing very satisfactory work, and will be amply sufficient for sinking purposes. The company has no other outside improvements but a small carpenter and blacksmith shop, with the exception of a pipe line of 3 and 2 inch pipe, which brings a supply of water from springs in the Carracita Canyon, at a point 1½ miles above the mine. At present the company is working 17 men, including a foreman and night-shift boss, in this slope, and has been driving on double shift from the start.

On June 1 the company started slope No. 2 on the Ayers or upper seam and distant about 3,000 feet from No. 1 slope. The company expect to bring the coal from this mine to the tipple at No. 1 slope by means of a tramroad and small locomotive. No. 2 slope is now down 140 feet from the apex, of which 92 feet is double timbered and the balance open cut, on a pitch of 14 degrees. Seam of coal at face shows 5 feet 7 inches, with 5 feet of fine coal. Sinking is carried on at this slope with a whim. In the near future sinking will be done with a hoisting engine and boiler.

The analysis, from a complete section of the vein, shows the following results:

Water	1.275
Volatile matter	38.225
Fixed carbon	47.100
Ash	13.400
	100.000
Sulphur	.645

The company is working 6 men and a foreman in this slope, besides 25 men employed in various capacities outside.

Mr. Hills, the geologist of the Colorado Fuel and Iron Company, who examined the property, constructed a coke oven of adobe bricks and coked some of the coal from the Akers seam, which gave the following analysis:

Water	1.450
Volatile matter	3.900
Fixed carbon	76.825
Ash	17.825
	100.000
Sulphur	.611

You ask for the valuation of our improvements, but, as I said above, the company has little as yet which could properly come under that head. The cost of the operation so far has been about $15,000, which includes a supply of tools sufficient to last some time, and also machinery which is not yet upon the ground. The company propose to erect a washer and a block of coke ovens as soon as practically can be done. In addition to this operation the company has a 200-foot proving slope down on the upper seam, at a point 3 miles below Malagra Hill, but did not find enough coal to warrant an operation.

When we get a map of our workings complete, shall take pleasure in sending you a copy.

Yours, very truly,

NEW MEXICO FUEL COMPANY,
T. L. WELLES, *Superintendent.*

Mr. J. W. FLEMING,
United States Mining Inspector, Silver City, N. Mex.

COLFAX COUNTY.

BLOSSBURG MINE.

[J. A. Wiggs, superintendent; J. Van Houten, vice-president; M. M. Walsh, pit boss.]

This mine is located at the town of Gardiner, Colfax County, N. Mex., and about 4½ miles in a westerly direction from the town of Raton, N. Mex., where the general offices of the company are located. Owned and operated by the Raton Coal and Coke Company. Kind of coal, bituminous; thickness of vein varies from 6 to 8 feet; total output fiscal year ended June 30, 1899, 308,316 tons; estimated value of output this year not given; average number of men employed inside, 125; average number of men employed outside, including men employed on construction work, etc., 100; average number of boys employed inside, 15; length of new drift (main diagonal), 2,700 feet; number of days mine was operated, 300; where coal is marketed, New Mexico, Arizona, and Mexico; number tons of coal used at mine, 4,826 tons.

This mine is located on a branch of the Atchison, Topeka and Santa Fe Railroad, connecting with the main line at Dillon Station. This is the largest mine in the Territory, having a capacity of 1,500 tons per day. It is operated upon the double-entry system. Most of the coal is marketed on the New Mexico and Rio Grande divisions of the Atchison, Topeka and Santa Fe Railway Company, between Raton, N. Mex., and El Paso, Tex.; also on the Mexican Central Railway from El Paso, Tex., south, and on the Southern Pacific Railroad, from Deming, N. Mex., west.

RECORD OF INSPECTION.

September 17, 1898.—On this date I inspected the machinery belonging to the Blossburg mines. I found the machinery in good condition.

September 19, 1898.—On this date I inspected Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 right entries of the Blossburg mine No. 4 and the rooms thereon. I measured 49,550 cubic feet of air entering the mine per minute and measured 51,200 cubic feet of air returning per minute. I found the workings which I inspected well ventilated and in good condition.

September 20, 1898.—I continued my inspection of the Blossburg mine No. 4. I inspected Nos. 11 and 12 right entries and the rooms thereon. I found the ventilation good throughout the workings and found the working places in good condition.

October 19, 1898.—I inspected the mine known as the Blossburg mine No. 6. I measured 8,000 cubic feet of air entering the mine per minute. I then inspected all the working places in the mine I found the roof of the straight entry in an unsafe condition, and ordered the pit boss to have said entry timbered with good substantial timbers.

October 20, 1898.—On this date I commenced my inspection of the Blossburg mine No. 4. I measured 39,480 cubic feet of air entering the mine per minute and measured 41,600 cubic feet of air returning per minute. I found the roof of No. 6 room on the second left entry in an unsafe condition and ordered the pit boss to have the loose rock taken down and the place timbered at once. The work was commenced and the pit boss assured me that the room would be made secure from all danger before he would allow the miners to work therein.

October 21, 1898.—I continued my inspection of the Blossburg mine No. 4. I inspected Nos. 5, 6, 7, and 8 right entries and No. 12 left entry and the workings thereon. I found the ventilation good throughout the working places. I found several rooms (which were not being worked) driven up a distance of over 200 feet without a crosscut and I ordered crosscuts driven every 100 feet in all rooms.

November 22, 1898.—I inspected the Blossburg mine No. 6. I measured 9,900 cubic feet of air entering the mine per minute. I then inspected the working places of the mine and found the workings well ventilated and in good condition.

November 23, 1898.—On this date I visited and inspected the mine known as the Blossburg mine No. 4. I measured 42,600 cubic feet of air entering the mine per minute, and measured 42,200 cubic feet of air returning per minute. I found the ventilation good throughout the workings of the mine, and found the mine well timbered and in good condition.

December 13, 1898.—I visited and inspected the machinery and boilers belonging to the Blossburg mines. I found the machinery in good condition.

December 14, 1898.—I inspected the mine known as the Blossburg mine No. 6. I measured 3,960 cubic feet of air entering the mine per minute. I then inspected the working places in the mine and found the workings well ventilated and in good condition.

December 15, 1898.—I inspected the mine known as the Blossburg mine No. 4. I measured 43,180 cubic feet of air entering the mine per minute and measured 45,360

cubic feet of air returning per minute. I then inspected the working places throughout the mine and found the mine well ventilated and the workings well timbered and in good condition.

January 18, 1899.—On this date I inspected the machinery belonging to the Blossburg mines and found the machinery in good condition.

January 19, 1899.—I visited and inspected the Blossburg mine No. 6. I measured 6,380 cubic feet of air entering the mine per minute. I then inspected the air courses and working places throughout the mine and found the workings in good condition.

January 20, 1899.—I inspected the Blossburg mine No. 4. I measured 40,820 cubic feet of air entering the mine per minute and measured 42,840 cubic feet of air returning per minute. I then inspected the workings of the mine; found the mine well ventilated and in good condition.

February 20, 1899.—I inspected the Blossburg mine No. 6. I measured 7,440 cubic feet of air entering the mine per minute. I then inspected the air courses and working places in the mine and found the workings well ventilated and in good condition.

February 21, 1899.—I inspected the mine known as the Blossburg mine No. 4. I measured 42,000 cubic feet of air entering the mine per minute. I then inspected the workings of the mine and found the workings well ventilated and in good condition.

March 15, 1899.—I visited the Blossburg mine No. 4 for the purpose of inspecting room No. 2 on the fourth right entry, where a fatal accident had occurred, causing the deaths of William Lipscomb and Juan M. Rivera. (See report of fatal accidents.)

March 16, 1899.—I inspected the Blossburg mine No. 4. I measured 32,760 cubic feet of air entering the mine per minute. I then inspected Nos. 7, 8, 9, 10, 11, and 12 right entries and the workings thereon. I found room No. 11 on the seventh right entry and room No. 8 on No. 8 right entry being worked without the use of timbers, and ordered said rooms timbered before any more mining was done therein; but as usual the miners wanted to load a few more cars of coal before they commenced timbering.

I informed them that the cause of a great many fatal accidents from falls of rock in mines was caused by the miners being too anxious to load another car or two of coal before securing their working places with timbers, and ordered them to either timber their working places at once or discontinue working in said places until such time as the places were timbered. They then commenced timbering the rooms.

March 17, 1899.—I continued my inspection of the Blossburg mine No. 4. I inspected Nos. 1, 2, 3, 4, 5, and 6 left entries and the workings thereon; also, Nos. 13 and 14 right entries. I found the roof at the face of No. 1 right entry in bad condition and had the work stopped until said place was timbered. Also found room No. 15 on No. 3 left entry in bad condition, and ordered said room timbered before any more mining was done in the room. The work of timbering was commenced at once.

March 18, 1899.—I inspected the mine known as the Blossburg mine No. 6. I measured 9,280 cubic feet of air entering the mine per minute, and then inspected the workings of the mine and found the workings in good condition. I also took air measurements throughout the workings of the Blossburg mines Nos. 4 and 6, and found the air measurements to be as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Intake in main entry	7,680
Intake in No. 6 mine	9,280
Air traveling around face of Nos. 7, 8, 9, 10, 11, and 12 right entries, where pillars were drawn	18,400
Last crosscut between Nos. 14 and 15 left entries	13,200
Intake on No. 12 left entry	10,800
Air traveling around Nos. 6, 7, 8, and 9 right entries, where pillars are drawn	15,180
Intake on old Blossburg hauling entry	5,000
Intake to Nos. 7 and 8 right entries	12,240
Last crosscut between first and second left entries	8,320
Last crosscut between third and fourth left entries	3,600
Last crosscut between fifth and sixth left entries	3,500
Last crosscut at face of main entry	6,720
Air traveling in No. 10 right entry	8,285
Face of No. 13 right entry	8,050
Return at fan	33,600

April 18, 1899.—I inspected the mine known as the Blossburg mine No. 6. I measured 7,680 cubic feet of air entering the mine per minute. I then inspected the workings of the mine and found the workings in fair condition.

April 19, 1899.—I inspected the Blossburg mine No. 4. I measured 40,400 cubic feet of air entering the mine per minute. I then inspected the workings of the mine and

found the workings in fair condition. I also inspected the machinery belonging to the mines and found the machinery in good condition.

May 16, 1899.—I visited the Blossburg mine No. 4. Just before my arrival at the mine Thomas Hermann, a miner, was killed on entry No. 20 by electric wires. (See fatal accidents reports.)

May 17, 1899.—I inspected the Blossburg mine No. 4. I inspected No. 12 left entry, also the entry known as the Blossburg main, and the workings thereon, and took air measurements. I measured 54,040 cubic feet of air entering the mine per minute and measured 56,700 cubic feet of air returning per minute. I measured 5,400 cubic feet of air traveling per minute in No. 12 left entry, and 2,800 cubic feet of air traveling the Blossburg main entry. I found the workings, which I inspected, in good condition.

May 18, 1899.—I continued my inspection of the Blossburg mine No. 4. I inspected Nos. 1, 2, 3, and 4 left entries and the workings thereon. I measured 13,120 cubic feet of air traveling per minute at the face of Nos. 1 and 2 left entries, and measured 4,200 cubic feet of air traveling per minute in the last crosscut between Nos. 3 and 4 left entries. I found the workings well ventilated. I found the roof of No. 15 room, on the 4th left entry, in a dangerous condition on account of the rock being loose and not being properly timbered, and ordered work stopped in said room until the room was properly timbered. The work was stopped and the timbermen were ordered to timber the room as soon as possible.

May 19, 1899.—On this date I inspected Nos. 1, 2, 3, 4, 13, and 14 left entries, also Nos. 6, 7, 8, 9, 10, 11, 12, 13, and 14 right entries of the Blossburg mine No. 4, and the workings thereon. I found the workings in good condition. I ordered the pit boss to keep a close watch on the miners and see that they kept their places well timbered.

June 21, 1899.—I inspected the machinery belonging to the Blossburg mines, and found the machinery in good condition.

June 22, 1899.—I inspected the Blossburg mine No. 6. I measured 15,750 cubic feet of air entering the mine per minute, and measured 6,750 cubic feet of air traveling through the last crosscut at the face of the main and back entries. I found the workings well ventilated. I found a place in the roof of the main entry in a dangerous condition and ordered the place timbered. The timbering was commenced at once.

June 23, 1899.—I inspected the Blossburg mine No. 4. I took air measurements throughout the workings, which I found to be as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Last crosscut at face of Nos. 1 and 2 left entries	15,600
Last crosscut between Nos. 3 and 4 left entries	12,000
Last crosscut between Nos. 5 and 6 left entries	3,800
Last crosscut at face of diagonal entries	8,910
Air traveling around Nos. 7, 8, 9, 10, 11, 12, 13, and 14 left entries, where the pillars were drawn	10,060
Intake on No. 11 left entry	9,600

I found the roof of No. 5 room, on the 12th right entry, and No. 13 room, on No. 11 right entry, in a dangerous condition, and ordered said rooms timbered.

June 26, 1899.—I again visited the Blossburg mine No. 4 for the purpose of ascertaining if the timbering had been done in room No. 5, on the 12th right entry, and No. 13 room, on the 11th right entry, according to my instructions of June 23. I found that said rooms had been timbered.

The above report on the Blossburg mine includes No. 4 and No. 6 mines, which are practically one mine and on the same vein, owned and operated by the same company. All haulage is done through the main diagonal entry, which is 2,700 feet in length.

DESCRIPTION OF THE PROPERTY OF THE RATON COAL AND COKE COMPANY, INCLUDING THE NEW ELECTRIC PLANT.

Lands.—There are 10,000 acres of coal land embraced in the property of the company, in which there are several seams of coal. At present, however, only one seam of coal is being worked by two mines, the Blossburg No. 4 and No. 6, both of which are drift mines on the same vein, and the workings of which are connected. The coal vein averages from 6 to 8 feet in thickness; and the mines are dry and comparatively free from gas. The coal is an excellent quality of bituminous coal.

Coke ovens.—There are at present 76 beehive coke ovens of standard size, 13 feet in diameter. There is a peculiar feature in connection with the ovens, which is quite an innovation in the West, and that is the use of a hot-air flue located between the

ovens, which are double-row batteries, and which flue enables the company to economize and utilize the waste heat for generating steam. The waste heat is conducted by means of this flue and smokestacks on the boiler to the boiler plant, midway between the two batteries of ovens, and generates a large proportion of the steam power required for the operation of the electric plant.

Power.—The mines are equipped with 3 generators, aggregating 500 horsepower, using a 500-volt current. The plant is of the latest improved type, modern in every respect.

Mining.—Mining is done by a plant of 8 Morgan-Gardiner electric mining machines, undercutting the coal 7 feet in depth and 44 inches wide, 4 inches high. The time for cutting requires about four and a half minutes. Hauling from the partings in the mine is done by 3 electric locomotives, which are in very successful operation, economizing cost of production and facilitating a ready increase of output at all times.

Washing plant.—The washing plant, which consisted of two (400 tons capacity each) Robinson-Wiggs coal washers, with all the latest improved appliances for washing and handling 800 tons of coal per day, also the tipple, which was of the latest improved construction, using automatic dumping apparatus and other minor appliances, was burnt to the ground on the 2d day of September, 1898, causing a heavy loss to the company.

Trolley line.—There is now about 9,600 feet of trolley line in use, 3,000 feet of which runs from the mouth of the mine to the tipple. The trolley line for the hauling system is of No. 2/o hard-drawn copper. All partings along the hauling system inside of the mine are furnished with electric lights. The line material was all furnished by the Ohio Brass Company, of Mansfield, Ohio. All the machinery, large and small, is driven by electric motors.

Ventilation.—The mines are ventilated at present by one 25-foot diameter Guibal mine fan, driven by electric motor. The mine also has a 22-foot Guibal fan, which the company will use as a reserve, so that the mine will at all times be provided with ample ventilating capacity.

Machine shop.—A large machine shop, with modern tools, has been erected for the purpose of manufacturing and repairing all the machinery in use on the property.

Houses.—During the last fiscal year ended June 30, 1899, the company erected 50 new dwelling houses, a large hotel and hospital, which, together with the 134 dwelling houses already erected and in use by the company, afford ample accommodation for all employees.

Store.—A large brick store, 1½ stories, 75 by 120 feet, which is well supplied with merchandise, is also owned by the company.

Summary.—The property now being operated is thoroughly modern and up to date, the most complete of its kind in the West. All labor-saving appliances and devices have been introduced, which are now in successful operation at the plant, that are now known in the mining trade.

SMITH MINE NO. 2.

[Albert G. Shaw, lessee and general manager.]

This mine is located about 1 mile north of the town of Raton, Colfax County, N. Mex., owned by the Maxwell Land Grant Company, and is operated under lease by Albert G. Shaw. Kind of coal, bituminous; thickness of vein, 4 feet; total output fiscal year ended June 30, 1899, 3,631 tons; estimated value of output this year, $6,364.25; length of drift, 300 feet; value of improvements this year, $150; average number of men employed inside, 6; average number of boys employed inside, 2; number of days mine worked, 290; where coal is marketed, town of Raton, N. Mex.

The product of this mine is hauled in wagons to the town of Raton, N. Mex., and retailed to the domestic trade. Capacity is about 20 tons per day. This mine is ventilated by a furnace.

RECORD OF INSPECTION.

October 18 1898.—On this date I inspected the Smith mine No. 2. I measured 2,700 cubic feet of air entering the mine per minute and measured 2,850 cubic feet of air returning per minute. I found the workings of the mine in good condition.

December 12, 1898.—I again inspected the Smith mine No. 2. I measured 1,520 cubic feet of air entering the mine per minute and measured 1,650 cubic feet of air returning per minute. I found the workings of the mine in good condition.

February 16, 1899.—I again inspected the Smith mine No. 2. I measured 2,100 cubic feet of air entering the mine per minute and measured 2,170 cubic feet of air returning per minute. I found the workings of the mine in good condition.

March 20, 1899.—I again inspected the Smith mine No. 2. I found the workings of the mine in good condition.

May 20, 1899.—I again inspected the Smith mine No. 2. I measured 1,320 cubic feet of air entering the mine per minute. I found the workings of the mine in good condition.

July 28, 1899.—I again inspected the Smith mine No. 2. I measured 4,100 cubic feet of air entering the mine per minute and measured 2,205 cubic feet of air returning per minute. I found the workings of the mine in good condition.

MESA MINE.

This mine is located about 7 miles east of Raton, Colfax County, N. Mex., and is now operated by the Honeyfield Brothers. Kind of coal, bituminous; thickness of vein, 5 feet; total output fiscal year ended June 30, 1899, 1,100 tons. Estimated value of output this year, $1,925; average number of men employed at mine, 5; length of drift, 400 feet; total value of improvements, $1,000; mine in operation, 210 days; where coal is marketed, town of Raton, N. Mex.

The product of this mine is hauled in wagons to the town of Raton, N. Mex., and retailed to the domestic trade. Capacity, about 20 tons per day. Ventilation, natural.

RECORD OF INSPECTION.

October 22, 1898.—On this date I inspected the Mesa mine. I inspected the underground workings of the mine and found the workings in good condition.

December 16, 1898.—I again inspected the Mesa mine. I measured 1,500 cubic feet of air entering the mine per minute and measured 1,560 cubic feet of air returning per minute. I found the ventilation good throughout the workings of the mine and found the workings well timbered and in good condition.

LATAMORE MINE.

[G. B. Latamore, general manager.]

This is a new mine located about 6½ miles east of the town of Raton, Colfax County, N. Mex., owned and operated by G. B. Latamore.

April 21, 1899.—On this date I inspected the mine known as the Latamore mine. At the time of my visit a drift had been driven in on a vein of coal a distance of 300 feet and had one room turned. The vein of coal is 5 feet in thickness and is a fine quality of bituminous coal. I found the mine without a second opening and ordered the general manager to have the second opening made so that air could circulate up to the face of the workings. The general manager informed me that a second opening would be made as soon as possible.

June 27, 1899.—I again inspected the mine known as the Latamore mine. The second opening was not completed. I found the workings of the mine in good condition.

The product of this mine is hauled in wagons to the town of Raton, N. Mex., and retailed to the domestic trade. There are three men employed, and the mine produced during the fiscal year about 600 tons.

RIO ARRIBA COUNTY.

MONERO MINE NO. 1.

[J. H. Crist, general manager; E. A. Fiske, president.]

This mine is located at Monero, Rio Arriba County, N. Mex., on the Denver and Rio Grande Railroad. Owned and operated by the Rio Arriba Coal Company. Kind of coal, bituminous; thickness of vein, 3 feet 10 inches; total output fiscal year ended June 30, 1899, 30,000 tons; estimated value of output, $37,500; depth of slope, 1,700 feet; total value of improvements, $13,000; average number of men employed inside, 24; average number of men employed outside, 8; number of days mine was operated, 295; where coal is marketed, Denver and Rio Grande Railroad Company.

RECORD OF INSPECTION.

September 12, 1898.—On this date I inspected the mine known as the Monero mine No. 1. I measured 8,000 cubic feet of air entering the mine per minute and measured 8,400 cubic feet of air returning per minute. I found the miners working too far in advance of the air in No. 1 left entry, and ordered a crosscut (air way) driven at the face of the entry, so as to force the air to the face of the workings.

September 14, 1898.—I again visited the Monero mine No. 1 to ascertain if the crosscut had been driven at the face of No. 1 left entry, as per my instructions of September 12. I found that my instructions had been complied with and the crosscut had been driven.

October 28, 1898.—I again inspected the Monero mine No. 1. I measured 7,600 cubic feet of air entering the mine per minute and measured 8,000 cubic feet of air returning per minute. I found the workings of the mine well ventilated and in good condition.

December 9, 1898.—I again inspected Monero mine No. 1. I measured 8,800 cubic feet of air entering the mine per minute and measured 9,200 cubic feet of air returning per minute. I found the air course on the right of the slope in bad condition and ordered the air course cleared of all falls of rock. The work of clearing the air course was commenced at once. I then took air measurements at the bottom of the slope and measured 2,500 cubic feet of air traveling per minute.

February 13, 1899.—I again inspected the Monero mine No. 1. I measured 4,550 cubic feet of air entering the mine per minute and measured 4,940 cubic feet of air returning per minute. I found very little air traveling at the face of the first left entry and ordered a crosscut driven from the face of the entry to the main air course.

June 16, 1899.—I again visited the Monero mine No. 1. I measured 6,300 cubic feet of air entering the mine per minute and measured 6,650 cubic feet of air returning per minute. I also measured 4,500 cubic feet of air per minute traveling in the air course leading to the first left entry, which was the only place being worked upon the above date. I found the ventilation good throughout the workings. I found some of the miners working in their rooms without using any timbers, and I instructed the miners to keep their working places well timbered.

MONERO MINE NO. 2.

[J. H. Crist, general manager; E. A. Fiske, president.]

This mine is located at Monero, Rio Arriba County, N. Mex., on the Denver and Rio Grande Railroad. Owned and operated by the Rio Arriba Coal Company. Kind of coal, bituminous; thickness of vein, 3 feet 6 inches; total output fiscal year ended June 30, 1899, 9,000 tons; estimated value of output, $13,600; depth of slope, 700 feet; value of improvements, $2,000; average number of men employed inside, 9; average number of men employed outside, 4; average number of boys employed, 2; number of days mine was operated, 240; number of tons used at mine, 250; where coal is marketed, for commercial uses along line of Denver and Rio Grande Railroad.

RECORD OF INSPECTION.

September 13, 1898.—On this date I inspected the mine known as the Monero mine No. 2. I measured 2,340 cubic feet of air entering the mine per minute and measured 2,400 cubic feet of air returning per minute. I found the workings of the mine in good condition.

October 26, 1898.—I again inspected the Monero mine No. 2. I measured 2,660 cubic feet of air entering the mine per minute and measured 2,680 cubic feet of air returning per minute. I found the workings of the mine well ventilated and in good condition.

December 8, 1898.—I again inspected the Monero mine No. 2. I measured 4,000 cubic feet of air entering the mine per minute and measured 4,100 cubic feet of air returning per minute. I also measured 2,500 cubic feet of air per minute traveling at the bottom of the slope. I found the mine well ventilated and in good condition.

February 11, 1899.—I again inspected Monero mine No. 2. I measured 2,700 cubic feet of air entering the mine per minute and measured 2,850 cubic feet of air returning per minute. I found the return air course in bad condition, caused by falls of rock, and ordered the air course cleared of all falls of rock; otherwise the mine was in good condition.

June 15, 1899.—I again inspected the Monero mine No. 2. I found the return air course in bad condition and ordered the general manager to have the air course cleared of all falls of rock and put in good condition. The work was at once commenced.

LUMBERTON MINE.

[James Corrigan, manager.]

This mine is located about 1 mile south of the town of Lumberton, Rio Arriba County, N. Mex. Owned and operated by James Corrigan. This is a new mine, which has been operated in a small way since July, 1898. The development work consists of a drift driven in on the vein of coal a distance of 250 feet, and 3 rooms have been turned off from the drift. The vein of coal is 2 feet 8 inches in thickness and of a bituminous character. The daily production is about 10 tons The coal is hauled in wagons and sold to the local trade in the town of Lumberton, N. Mex., also to the Biggs Lumber Company, operating in Rio Arriba County.

October 27, 1898.—On this date I inspected the Lumberton mine and found the workings in good condition. On my next visit to Monero, on December 12, I was informed that this mine was closed down. No report of the production was made.

SANTA FE COUNTY.

WHITE ASH MINE.

[James Duggan, superintendent; William Graham, pit boss.]

This mine is located about 2½ miles south of the town of Los Cerrillos, Santa Fe County, N. Mex. Owned and operated by the Cerrillos Coal Railroad Company. Kind of coal, bituminous; thickness of vein, 5 feet 6 inches; total output fiscal year ended June 30, 1899, 56,000 tons; estimated value of output, $89,600; average number of men employed inside, 70; average number of men employed outside, 15; average number of boys employed inside, 3; number of days mine worked, 262; number of tons used at mine 1,200; where coal is marketed, New Mexico, Arizona, Mexico, and Texas.

This mine is situated on a branch line of the Atchison, Topeka and Sante Fe Railroad, which connects with the main line at Waldo Station.

RECORD OF INSPECTION.

September 7, 1898.—On this date I inspected the White Ash mine. I took air measurements throughout the workings and found the mine well ventilated and in good condition.

October 11, 1898.—I again inspected the White Ash mine. I took air measurements throughout the workings and found them well ventilated and in good condition.

November 29, 1898.—I again inspected the White Ash mine. I took air measurements throughout the workings of the mine and found the mine well ventilated. At the time of my visit the only work being done in the mine was the drawing of pillars, and I ordered the superintendent to keep the miners supplied with plenty of good props and timbers for the purpose of securing their working places from danger.

December 23, 1898.—I inspected the machinery of the White Ash mine and found the machinery in good condition.

January 25, 1899.—I again inspected the White Ash mine and took air measurements and found the air distributed in compliance with the law. I found four sets of timbers broken in the first right entry and ordered new timbers put in at once. The pit boss ordered the timbers brought into the mine and informed me that the work would be commenced as soon as the timbers arrived.

February 23, 1899.—I again inspected the White Ash mine and took air measurements and found the air distributed throughout the workings in compliance with the law. On this date I found the workings of the mine in good condition.

February 28, 1899.—I inspected the machinery belonging to the White Ash mine and found the machinery in good condition.

March 22, 1899.—I again visited the White Ash mine and took air measurements throughout the workings and found the workings well ventilated. I found some of the timbers broken in the first right entry and ordered new timbers put in at once. The pit boss informed me that he would have the timbermen commence the work immediately.

April 27, 1899.—I again inspected the White Ash mine. I found the workings of the mine in good condition. The only work being done on this date was the drawing of the slope pillars, and all pillars will be drawn inside of thirty days, when this mine will be closed down.

May 11, 1899.—On this date I made a final inspection of the White Ash mine. The pillars were all drawn, the mine worked out and abandoned.

LUCAS MINE.

[James Duggan, superintendent; John Hunt, pit boss.]

This mine is located 3 miles south of the town of Los Cerrillos, Santa Fe County, N. Mex. Owned and operated by the Cerrillos Coal Railroad Company. Kind of coal, anthracite; thickness of vein, 3 feet 9 inches; total output, fiscal year ended June 30, 1899, 45,000 tons; estimated value of output, $105,000; depth of slope, 1,800 feet; total value of improvements, $6,000; average number of men employed inside, 160; average number of men employed outside, 35; average number of boys employed inside, 5; average number of boys employed as slate pickers outside, 15; number of days mine was operated, 192; number of tons coal used at mine, 1,000 tons; where coal is marketed, New Mexico, Arizona, California, Colorado, and Kansas.

This mine is located on a branch of the Atchison, Topeka and Santa Fe Railroad, which connects with the main line of the road at Waldo Station. The mine has a capacity of 450 tons per day, and is ventilated by a double 6-foot Murphey fan.

RECORD OF INSPECTION.

September 2, 1898.—On this date I inspected the mine known as the Lucas mine, which is owned and operated by the Cerrillos Coal Railroad Company. I measured 11,000 cubic feet of air entering the mine per minute. I then inspected Nos. 3, 4, and 5 right entries and the rooms thereon. I found the workings which I inspected well ventilated and in good condition.

September 3, 1898.—I continued my inspection of the Lucas mine. I inspected Nos. 1 and 2 right entries and the rooms thereon and took air measurements. I found the workings well ventilated and in good condition.

October 12, 1898.—I again inspected the Lucas mine. I measured 12,000 cubic feet of air entering the mine per minute and measured 12,250 cubic feet of air returning per minute. I found the miners in No. 4 right entry working too far in advance of the air, and ordered a crosscut driven at the face of the entry to connect with the back entry or air course, and ordered the last crosscut bratticed and made air-tight, so as to force the air up to the face of the workings. The work of driving the crosscut was commenced.

October 17, 1898.—I again visited the Lucas mine to ascertain if the crosscut had been driven as per my instructions of October 12. I found that my instructions had been complied with and I found the ventilation very much improved.

November 29, 1898.—I again visited the Lucas mine. I measured 17,760 cubic feet of air entering the mine per minute and measured 19,500 cubic feet of air returning per minute. I found the air distributed throughout the workings as follows:

	Cubic feet.
Last crosscut near the face of fourth right entry	3,520
Top of raised plane on the fourth right entry	6,400
Above the fourth right entry on slope	7,200
Dip plane on the second right entry	1,800

I found the mine well ventilated and found the workings of the mine well timbered and in good condition.

December 22, 1898.—I again inspected the Lucas mine. I measured 13,720 cubic feet of air entering the mine per minute. I then inspected all of the underground workings and found the mine well ventilated and in good condition.

January 27, 1899.—I again inspected the Lucas mine. I measured 17,000 cubic feet of air entering the mine per minute and measured 18,900 cubic feet of air returning per minute. I then inspected the fourth right entry and No. 1 dip plane, and found the workings well ventilated and in good condition.

January 28, 1899.—I continued my inspection of the Lucas mine. I inspected Nos. 2 and 3 right entries and No. 1 dip plane, which is driven between Nos. 2 and 4 right entries, and found the workings in good condition.

January 30, 1899.—I inspected the machinery belonging to the Lucas mine and found the machinery in first-class condition.

February 24, 1899.—I again inspected the Lucas mine. I measured 14,880 cubic feet of air entering the mine per minute and measured 15,750 cubic feet of air returning per minute. I found the workings of the mine in good condition,

February 28, 1899.—I inspected the machinery belonging to the Lucas mine and found the machinery in good condition.

March 17, 1899.—I again inspected the Lucas mine. I measured 14,400 cubic feet of air entering the mine per minute and measured 14,700 cubic feet of air returning per minute. I then inspected the main slope and No. 5 right entry. I measured 3,840 cubic feet of air traveling on the slope between Nos. 4 and 5 right entries. I found the workings well timbered and in good condition.

March 28, 1899.—I continued my inspection of the Lucas mine. I inspected No. 4 right entry and No. 1 dip plane on the fourth right entry, also No. 3 right entry. I found the workings which I inspected in good condition.

May 13, 1899.—I again inspected the Lucas mine. I measured 16,800 cubic feet of air entering the mine per minute and measured 18,000 cubic feet of air returning per minute. I also took air measurements in the slope and in the first dip plane on the fourth right entry, which were as follows:

	Cubic feet.
On slope between Nos. 3 and 4 right entries	8,640
On slope below the fourth right entry	4,800
First dip plane between Nos. 2 and 3 right rooms	1,190

The only work being done in the mine was development work, driving the slope, entries, and turning rooms. I found the mine well ventilated and found the workings in good condition.

October 27, 1898.—On this date I inspected the Lumberton mine and found the workings in good condition. On my next visit to Monero, on December 12, I was informed that this mine was closed down. No report of the production was made.

SANTA FE COUNTY.

WHITE ASH MINE.

[James Duggan, superintendent; William Graham, pit boss.]

This mine is located about 2½ miles south of the town of Los Cerrillos, Santa Fe County, N. Mex. Owned and operated by the Cerrillos Coal Railroad Company. Kind of coal, bituminous; thickness of vein, 5 feet 6 inches; total output fiscal year ended June 30, 1899, 56,000 tons; estimated value of output, $89,600; average number of men employed inside, 70; average number of men employed outside, 15; average number of boys employed inside, 3; number of days mine worked, 262; number of tons used at mine 1,200; where coal is marketed, New Mexico, Arizona, Mexico, and Texas.

This mine is situated on a branch line of the Atchison, Topeka and Sante Fe Railroad, which connects with the main line at Waldo Station.

RECORD OF INSPECTION.

September 7, 1898.—On this date I inspected the White Ash mine. I took air measurements throughout the workings and found the mine well ventilated and in good condition.

October 11, 1898.—I again inspected the White Ash mine. I took air measurements throughout the workings and found them well ventilated and in good condition.

November 29, 1898.—I again inspected the White Ash mine. I took air measurements throughout the workings of the mine and found the mine well ventilated. At the time of my visit the only work being done in the mine was the drawing of pillars, and I ordered the superintendent to keep the miners supplied with plenty of good props and timbers for the purpose of securing their working places from danger.

December 23, 1898.—I inspected the machinery of the White Ash mine and found the machinery in good condition.

January 23, 1899.—I again inspected the White Ash mine and took air measurements and found the air distributed in compliance with the law. I found four sets of timbers broken in the first right entry and ordered new timbers put in at once. The pit boss ordered the timbers brought into the mine and informed me that the work would be commenced as soon as the timbers arrived.

February 23, 1899.—I again inspected the White Ash mine and took air measurements and found the air distributed throughout the workings in compliance with the law. On this date I found the workings of the mine in good condition.

February 28, 1899.—I inspected the machinery belonging to the White Ash mine and found the machinery in good condition.

March 22, 1899.—I again visited the White Ash mine and took air measurements throughout the workings and found the workings well ventilated. I found some of the timbers broken in the first right entry and ordered new timbers put in at once. The pit boss informed me that he would have the timbermen commence the work immediately.

April 27, 1899.—I again inspected the White Ash mine. I found the workings of the mine in good condition. The only work being done on this date was the drawing of the slope pillars, and all pillars will be drawn inside of thirty days, when this mine will be closed down.

May 11, 1899.—On this date I made a final inspection of the White Ash mine. The pillars were all drawn, the mine worked out and abandoned.

LUCAS MINE.

[James Duggan, superintendent; John Hunt, pit boss.]

This mine is located 3 miles south of the town of Los Cerrillos, Santa Fe County, N. Mex. Owned and operated by the Cerrillos Coal Railroad Company. Kind of coal, anthracite; thickness of vein, 3 feet 9 inches; total output, fiscal year ended June 30, 1899, 45,000 tons; estimated value of output, $105,000; depth of slope, 1,800 feet; total value of improvements, $6,000; average number of men employed inside, 160; average number of men employed outside, 35; average number of boys employed inside, 5; average number of boys employed as slate pickers outside, 15; number of days mine was operated, 192; number of tons coal used at mine, 1,000 tons; where coal is marketed, New Mexico, Arizona, California, Colorado, and Kansas.

This mine is located on a branch of the Atchison, Topeka and Santa Fe Railroad, which connects with the main line of the road at Waldo Station. The mine has a capacity of 450 tons per day, and is ventilated by a double 6-foot Murphey fan.

RECORD OF INSPECTION.

September 2, 1898.—On this date I inspected the mine known as the Lucas mine, which is owned and operated by the Cerrillos Coal Railroad Company. I measured 11,000 cubic feet of air entering the mine per minute. I then inspected Nos. 3, 4, and 5 right entries and the rooms thereon. I found the workings which I inspected well ventilated and in good condition.

September 3, 1898.—I continued my inspection of the Lucas mine. I inspected Nos. 1 and 2 right entries and the rooms thereon and took air measurements. I found the workings well ventilated and in good condition.

October 12, 1898.—I again inspected the Lucas mine. I measured 12,000 cubic feet of air entering the mine per minute and measured 12,250 cubic feet of air returning per minute. I found the miners in No. 4 right entry working too far in advance of the air, and ordered a crosscut driven at the face of the entry to connect with the back entry or air course, and ordered the last crosscut bratticed and made air-tight, so as to force the air up to the face of the workings. The work of driving the crosscut was commenced.

October 17, 1898.—I again visited the Lucas mine to ascertain if the crosscut had been driven as per my instructions of October 12. I found that my instructions had been complied with and I found the ventilation very much improved.

November 29, 1898.—I again visited the Lucas mine. I measured 17,760 cubic feet of air entering the mine per minute and measured 19,500 cubic feet of air returning per minute. I found the air distributed throughout the workings as follows:

	Cubic feet.
Last crosscut near the face of fourth right entry	3,520
Top of raised plane on the fourth right entry	6,400
Above the fourth right entry on slope	7,200
Dip plane on the second right entry	1,800

I found the mine well ventilated and found the workings of the mine well timbered and in good condition.

December 22, 1898.—I again inspected the Lucas mine. I measured 13,720 cubic feet of air entering the mine per minute. I then inspected all of the underground workings and found the mine well ventilated and in good condition.

January 27, 1899.—I again inspected the Lucas mine. I measured 17,000 cubic feet of air entering the mine per minute and measured 18,900 cubic feet of air returning per minute. I then inspected the fourth right entry and No. 1 dip plane, and found the workings well ventilated and in good condition.

January 28, 1899.—I continued my inspection of the Lucas mine. I inspected Nos. 2 and 3 right entries and No. 1 dip plane, which is driven between Nos. 2 and 4 right entries, and found the workings in good condition.

January 30, 1899.—I inspected the machinery belonging to the Lucas mine and found the machinery in first-class condition.

February 24, 1899.—I again inspected the Lucas mine. I measured 14,880 cubic feet of air entering the mine per minute and measured 15,750 cubic feet of air returning per minute. I found the workings of the mine in good condition,

February 28, 1899.—I inspected the machinery belonging to the Lucas mine and found the machinery in good condition.

March 17, 1899.—I again inspected the Lucas mine. I measured 14,400 cubic feet of air entering the mine per minute and measured 14,700 cubic feet of air returning per minute. I then inspected the main slope and No. 5 right entry. I measured 3,840 cubic feet of air traveling on the slope between Nos. 4 and 5 right entries. I found the workings well timbered and in good condition.

March 28, 1899.—I continued my inspection of the Lucas mine. I inspected No. 4 right entry and No. 1 dip plane on the fourth right entry, also No. 3 right entry. I found the workings which I inspected in good condition.

May 15, 1899.—I again inspected the Lucas mine. I measured 16,800 cubic feet of air entering the mine per minute and measured 18,000 cubic feet of air returning per minute. I also took air measurements in the slope and in the first dip plane on the fourth right entry, which were as follows:

	Cubic feet.
On slope between Nos. 3 and 4 right entries	8,640
On slope below the fourth right entry	4,800
First dip plane between Nos. 2 and 3 right rooms	1,190

The only work being done in the mine was development work, driving the slope, entries, and turning rooms. I found the mine well ventilated and found the workings in good condition.

May 15, 1899.—I inspected the machinery belonging to the Lucas mine and found the machinery in good condition.

June 10, 1899.—I again inspected the Lucas mine. I measured 5,040 cubic feet of air entering the mine per minute and measured 5,200 cubic feet of air returning per minute. I found the workings of the mine in good condition. On this date the mine was not being operated.

COOK AND WHITE MINE.

[James Duggan, superintendent; William Graham, pit boss.]

This mine is located about 3 miles south of the town of Los Cerrillos, Santa Fe County, N. Mex. Owned and operated by the Cerrillos Coal Railroad Company. Kind of coal, bituminous; thickness of vein, 3 feet 9 inches; total output, fiscal year ended June 30, 1899, 145,000 tons; estimated value of output, $230,000; depth of slope, 1,800 feet; value of improvements this year, $5,000; total, $10,000; average number of men employed inside, 250; average number of men employed outside, 25; average number of boys employed inside, 10; number of days mine was operated, 260; number of tons used at mine, 1,000; where coal is marketed, New Mexico, Arizona, California, Old Mexico, and Texas, and to Atchison, Topeka and Santa Fe Railroad.

This mine is situated on a branch line of the Atchison, Topeka and Santa Fe Railroad, which connects with the main line at Waldo Station. At the terminus of this branch line is situated the town of Madrid, which is the post-office address of the Cerrillos Coal Railroad Company, and is quite a beautiful and substantial town, with about 1,200 inhabitants. The company owns all the dwellings and business houses of the town of Madrid, and following the "Record of Inspection" will be found a more complete description of the property of the Cerrillos Coal Railroad Company.

RECORD OF INSPECTION.

September 5, 1898.—On this date I commenced my inspection of the Cook and White mine. I inspected the following working places and took air measurements, which were as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Intake on main slope	39,200
Above the second right entry on slope	33,480
Face of third right back entry	5,270
Face of third right main entry	2,880
Return at bottom of slope on right side	13,350
Return at bottom of slope on left side	10,440
Face of third left main entry	3,200
Bottom of slope	25,740
Return on second right entry	18,900
Last crosscut on second right entry	12,600
No. 1 left room on No. 2 raised plane	6,000
No. 3 left room on No. 2 raised plane	5,880
Top of No. 2 raised plane	1,920
No. 1 right room on No. 2 raised plane	8,120
No. 2 right room on No. 2 raised plane	4,800
No. 3 left room on No. 1 raised plane	6,300
No. 5 left room on No. 1 raised plane	4,200
Top of No. 1 raised plane on second left entry	1,200
No. 3 right room on No. 2 raised plane	3,000
No. 1 right room on No. 1 raised plane	3,510

September 6, 1898.—I continued my inspection of the Cook and White mine and found the air measurements to be as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
No. 2 room on No. 2 raised plane, second left entry	4,095
Between Nos. 6 and 7 left rooms, second left entry	3,360
Between Nos. 7 and 8 left rooms, second left entry	2,240
Top of No. 2 raised plane, second left entry	9,240
Between Nos. 7 and 8 right rooms, second left entry	4,680
Between Nos. 1 and 2 right rooms, second left entry	5,800
Face of No. 1, right main entry	11,200
No. 1 left room on No. 3 raised plane, first right entry	7,680

	Cubic feet.
First left room on No. 2 raised plane, second right entry	3,050
First right room on No. 2 raised plane, second right entry	3,080
Top of No. 2 raised plane	7,000
Air course leading to first right entry	13,302
Face of No. 3 left back entry	2,100

I tested the face of No. 3 left back entry for gas, and found a very small amount of gas at the face of the entry.

December 21, 1898.—I continued my inspection of the Cook and White mine and found the air measurements to be as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Air course leading to No. 3 raised plane on first right entry	8,400
Air traveling in first right main entry	9,880
Air traveling in first right back entry at face of entry	16,000
Crosscut between Nos. 3 and 4 left rooms, No. 3 plane, No. 1 entry	1,800
Crosscut between Nos. 5 and 6 right rooms, No. 3 plane, No. 1 entry	2,430
Return at No. 3 fan	29,500
Return at No. 1 fan	13,725

With the exception of No. 3, left back entry, I found the workings of the mine in good condition, and just as soon as the crosscut in the third left back entry is completed the mine will be in first-class condition.

December 22, 1898.—On this date I again visited the third left back entry in the Cook and White mine for the purpose of ascertaining if the crosscut was being driven at the face of the entry, as per my instructions of the 19th instant. I found the miners at work driving the crosscut and they informed me that the crosscut would be completed on the evening of the 24th instant. On this visit I found no gas in the entry.

December 23, 1898.—On this date I inspected the hoisting engines, boilers, ropes, and fans belonging to the Cook and White mine and found them in good condition.

January 24, 1899.—I again commenced inspecting the Cook and White mine and took air measurements throughout the workings which I inspected. I found the air measurements to be as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Intake on main slope	37,520
Face of third left main entry	2,640
Face of third left back entry	3,720
Last crosscut at face of Nos. 3 left entries	8,100
Return from third left entry to second left entry	7,140
Face of third right main entry	6,750
Return from third right entry to second right entry	18,800
First left room on first left dip plane, second left entry	1,920
Bottom of first left dip plane, second left entry	900
Fourth right room on first left dip plane, second left entry	1,080
First right room on first left dip plane, second left entry	2,520
Top of first left dip plane (intake), second left entry	7,200

I found the above workings well ventilated and in good condition.

January 25, 1899.—I continued my inspection of the Cook and White mine and found the air measurements to be as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Face of No. 2 back entry	2,700
Face of No. 2 main entry	4,800
Intake to No. 1 raised plane	5,500
No. 1 left room on No. 1 raised plane	3,080
No. 1 right room on No. 1 raised plane	2,400
Crosscut between Nos. 2 and 3 right rooms, No. 1 raised plane	1,440
Crosscut between Nos. 3 and 4 left rooms, No. 1 raised plane	1,920
Crosscut between Nos. 7 and 8 right rooms, No. 1 raised plane	1,920
Crosscut between Nos. 9 and 10 left rooms, No. 1 raised plane	2,400

I found the above working places well ventilated and in good condition.

	Cubic feet.
No. 6 left room on No. 3 raised plane	2,520
No. 7 left room on No. 3 raised plane	3,000
Top of No. 3 raised plane	520
No. 6 right room on No. 3 raised plane	1,800
Last crosscut between Nos. 3 and 4 right rooms	1,920
No. 1 right room on No. 3 raised plane	3,100
Return between Nos. 2 and 3 raised plane, first right entry	16,200
Above second right entry on slope	34,560
Last crosscut at face of second right entry	8,360
Inside of No. 2 raised plane of second right entry	12,250
First left room on No. 2 raised plane	5,880
No. 4 left room on No. 2 raised plane	4,050
No. 6 left room on No. 2 raised plane	1,820
No. 4 right room on No. 2 raised plane	1,440
No. 1 right room on No. 2 raised plane	875
No. 2 right room on No. 2 raised plane	1,920
No. 5 left room on first raised plane	4,800
No. 7 left room on first raised plane	4,320
Top of No. 1 raised plane at face of workings	12,600
No. 7 right room on No. 1 raised plane	4,800
No. 2 right room on No. 1 raised plane	2,800
No. 1 right room on No. 1 raised plane	3,600

November 28, 1898.—I continued my inspection of the Cook and White mine and took air measurements, which I found to be as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Bottom of slope	25,300
Face of No. 3 left entry	4,000
No. 3 left back entry at slant	8,000
Face of No. 3 left back entry	2,280
Face of No. 3 right main entry	10,800
Face of No. 3 right back entry	5,460
Air traveling in No. 3 right entry	10,200
Return on right of slope, from No. 3 right entry	17,480
Return on left of slope, from No. 3 left entry	7,650
No. 1 right room on No. 2 raised plane, second left entry	4,550
Last crosscut between Nos. 2 and 3 right rooms	3,840
Last crosscut between Nos. 5 and 6 right rooms	2,600
No. 7 right room at face of room	3,300
Last crosscut between Nos. 5 and 6 left rooms	4,550
No. 2 left room at face of room	1,440
Return at No. 3 fan	25,000
Return at No. 1 fan	16,000
Total number of cubic feet of air returning	41,000

I found the mine well ventilated and found the workings of the mine in good condition.

December 19, 1898.—I again commenced my inspection of the Cook and White mine. I measured 39,200 cubic feet of air entering the mine per minute. I then inspected Nos. 3 right and left entries and found considerable gas generating at the face of No. 3 left back entry, and ordered a crosscut driven at the face of the entry. I also took air measurements throughout the workings, which were as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Last crosscut between Nos. 3 left (back and main) entries	7,040
Return on left of slope, from No. 3 left entry	7,200
Return on right of slope, from No. 3 right entry	16,170
Face of No. 3 right main entry	8,000
Between Nos. 1 and 2 entries on slope	35,600
Between Nos. 2 and 3 entries on slope	23,760

December 20, 1898.—I continued my inspection of the Cook and White mine and found the air measurements to be as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Second right entry inside of second raised plane	13,230
Last crosscut at face of No. 2 right entry	7,000

	Cubic feet.
Face of No. 3 left entry in crosscut	2,790
Back entry or air course, on third left, south of slant	7,235
Return to second left entry from third left entry	7,350
Return on right side of slope	22,750
Return to second right entry from third right entry	13,950
Crosscut at face of third right entries	6,720
Last crosscut at face of third right entry	5,175
No. 2 right entry, inside of No. 3 raised plane	18,000
Intake to second raised plane on No. 3 right entry	4,680
Intake to No. 1 raised plane on No. 3 right entry	7,920
Intake to No. 3 raised plane on No. 1 right entry	4,380
No. 1 back entry inside of last slant	6,300
Air traveling in first right entry outside of No. 3 raised plane	13,800
Return at top of No. 2 raised plane on second left entry	12,250

I found the workings of the mine well ventilated and in good condition.

February 28, 1899.—On this date I inspected the machinery belonging to the Cook and White mine, and found the machinery in good condition.

March 23, 1899.—I commenced my inspection of the Cook and White mine. I measured 40,200 cubic feet of air entering the mine per minute. I then inspected the main hauling slope, Nos. 3 right and left entries, No. 2 left entry, and No. 1 raised plane on the second left entry. I found a small amount of gas (fire damp) in No. 6 right room on No. 1 raised plane on the second left entry, and ordered canvas brattice put up so as to force the air up to the face of the room and clear the room of gas.

March 24, 1899.—I continued my inspection of the Cook and White mine. I inspected Nos. 1 and 2 right entries and the workings thereon. I found a small amount of gas (fire damp) in No. 1 right room on No. 1 raised plane on the second right entry, and ordered canvas brattice put up, so as force the air to the face of the room and clear the room of any gas that might generate therein. On this date the air measurements throughout the workings were as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Intake on main slope	42,200
Above air splits near bottom of slope	29,700
Left return at bottom of slope	9,680
Crosscut at face of No. 3 left entry	9,840
Return from third left entry to second left entry	9,900
Right return at bottom of slope	17,850
Crosscut near face of third right entry	9,990
Return from third right entry to second right entry	12,600
Intake to No. 1 right room on No. 1 raised plane, second left entry	6,600
Crosscut between Nos. 3 and 4 right rooms on No. 1 raised plane	7,800
Crosscut between Nos. 4 and 5 right rooms on No. 1 raised plane	2,000
Crosscut between Nos. 5 and 6 right rooms on No. 1 raised plane	4,860
Return from No. 1 raised plane to No. 1 right entry	3,750
Intake to No. 3 raised plane	6,500
Face of No. 1 right entry	9,990
Inside of No. 2 raised plane on first right entry	16,450
Top of No. 2 raised plane on second right entry	6,730
Top of No. 1 raised plane on second right entry	3,400
Crosscut at face of No. 2 right entries	6,480
Air traveling in No. 2 right entry	11,610
Return at No. 1 fan	18,040
Return at No. 3 fan	29,500

I found the workings of the mine well ventilated, and as soon as the work of bratticing up the rooms is finished, as per my instructions of March 23 and 24, the mine will be in good condition.

March 25, 1899.—On this date I inspected the machinery belonging to the Cook and White mine, and found the machinery in good condition.

April 22, 1899.—On this date, at about 9 o'clock a. m., I was informed that an explosion had occurred in the Cook and White mine at Madrid, N. Mex. I immediately sent a telegram to the superintendent of the Cook and White Mine, as follows:

JAMES DUGGAN, *Madrid, N. Mex.:*

I will start for mine to-day.

JOHN W. FLEMING.

I immediately got ready and started from Raton, N. Mex., for Madrid, N. Mex., at 12 o'clock m. Arrived at Madrid at 9 o'clock p. m., and on April 23 (Sunday) I

entered the Cook and White mine and went down into the third left main entry and tried to get as far as the face of the entry, but on account of the condition of the entries I could not get to the face of the entries. After coming out of the mine, I wrote the following letter, to wit:

MADRID, N. MEX., *April 23, 1899.*

SIR: A gas explosion occurred here in the Cook and White mine on April 21, at 11.55 a. m., which resulted in the killing of 4 men and 1 boy. I arrived here from Raton, N. Mex., at 9 o'clock p. m., and have been down in the mine to-day, but on account of the timbers and stoppings being blown out of place I could not get to the face of the entries where the men were working at the time the explosion occurred. Men are now working clearing the entries, timbering and repairing the stoppings. The bodies of the men and boy have been recovered. Will report fully as soon as possible.

Very respectfully yours,

JOHN W. FLEMING,
United States Coal Mine Inspector.

COMMISSIONER OF THE GENERAL LAND OFFICE,
Washington, D. C.

April 24, 1899.—I again went down into the Cook and White mine and entered the third left main entry, but on account of falls of rock caused by the explosion I could not get to the face of the main and back entries. I then took air measurements on the slope and left side of the mine, also in No. 3 right entries, which were as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Intake on slope	38,400
Below second right entry on slope	29,280
On slope above air splits, near bottom of slope	29,120
Right return near bottom of slope	17,020
Left return near bottom of slope	10,260
Return from third left main entry to second left back entry	12,960
Between the slant and last crosscut, about 140 feet from the face of the third left main entry	5,600
Return from third right main entry to No. 2 right back entry	13,650
Last crosscut at face of third right entries	5,980
Air traveling outside of slant in third right main entry	13,250

April 25, 1899.—I inspected the second right entries of the Cook and White mine and the workings thereon. I found a fall of rock in the back entry and ordered it cleared up at once. The work was commenced immediately. The air measurements on this date were as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Second right back entry, outside of No. 2 slant	10,560
No. 2 raised plane on second right entry (intake)	3,000
Outside of second raised plane on No. 2 main entry	2,700
Inside of second raised plane	13,200
Top of No. 2 raised plane on second right entry	5,440
Crosscut from No. 14 left room on No. 1 raised plane	7,020
Top of No. 1 raised plane, second right entry	4,800
Crosscut between Nos. 6 and 7 right rooms, No. 1 raised plane	875

On the evening of April 25 the crosshead of the engine which runs No. 1 fan broke, and work was suspended in the Cook and White mine until the engine was in running order. The engine was started April 27 at 11.45 p. m. No persons but the fire bosses were allowed in the mine until the morning of the 28th.

April 28, 1899.—At about 2 o'clock p. m. I was informed that the stoppings along the line of the third left entries, where the explosion occurred, had been repaired as far as the last crosscut. I then went down into the mine and went in as far as the last crosscut on the third left entries and found the main entry full of gas from the crosscut up to the face of the entry, and ordered the men to do no more work until all the men were out of the mine, which would be about 5 o'clock p. m. At 5 o'clock we commenced the work of bratticing the entry with canvas from the crosscut up to the face of the entry, so as to clear it of gas. At 6.30 p. m. the work was completed and I found one of the safety lamps which had been used by one of the men who had been killed in the entry. I also found that all props on which the brattice had been nailed before the explosion had occurred were still standing, but

	Cubic feet.
Face of No. 3 left entry in crosscut	2,790
Back entry or air course, on third left, south of slant	7,235
Return to second left entry from third left entry	7,350
Return on right side of slope	22,750
Return to second right entry from third right entry	13,950
Crosscut at face of third right entries	6,720
Last crosscut at face of third right entry	5,175
No. 2 right entry, inside of No. 3 raised plane	18,000
Intake to second raised plane on No. 3 right entry	4,680
Intake to No. 1 raised plane on No. 3 right entry	7,920
Intake to No. 3 raised plane on No. 1 right entry	4,380
No. 1 back entry inside of last slant	6,300
Air traveling in first right entry outside of No. 3 raised plane	13,800
Return at top of No. 2 raised plane on second left entry	12,250

I found the workings of the mine well ventilated and in good condition.

February 28, 1899.—On this date I inspected the machinery belonging to the Cook and White mine, and found the machinery in good condition.

March 23, 1899.—I commenced my inspection of the Cook and White mine. I measured 40,200 cubic feet of air entering the mine per minute. I then inspected the main hauling slope, Nos. 3 right and left entries, No. 2 left entry, and No. 1 raised plane on the second left entry. I found a small amount of gas (fire damp) in No. 6 right room on No. 1 raised plane on the second left entry, and ordered canvas brattice put up so as to force the air up to the face of the room and clear the room of gas.

March 24, 1899.—I continued my inspection of the Cook and White mine. I inspected Nos. 1 and 2 right entries and the workings thereon. I found a small amount of gas (fire damp) in No. 1 right room on No. 1 raised plane on the second right entry, and ordered canvas brattice put up, so as force the air to the face of the room and clear the room of any gas that might generate therein. On this date the air measurements throughout the workings were as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Intake on main slope	42,200
Above air splits near bottom of slope	29,700
Left return at bottom of slope	9,680
Crosscut at face of No. 3 left entry	9,840
Return from third left entry to second left entry	9,900
Right return at bottom of slope	17,850
Crosscut near face of third right entry	9,990
Return from third right entry to second right entry	12,600
Intake to No. 1 right room on No. 1 raised plane, second left entry	6,600
Crosscut between Nos. 3 and 4 right rooms on No. 1 raised plane	7,800
Crosscut between Nos. 4 and 5 right rooms on No. 1 raised plane	2,000
Crosscut between Nos. 5 and 6 right rooms on No. 1 raised plane	4,860
Return from No. 1 raised plane to No. 1 right entry	3,750
Intake to No. 3 raised plane	6,500
Face of No. 1 right entry	9,990
Inside of No. 2 raised plane on first right entry	16,450
Top of No. 2 raised plane on second right entry	6,730
Top of No. 1 raised plane on second right entry	3,400
Crosscut at face of No. 2 right entries	6,480
Air traveling in No. 2 right entry	11,610
Return at No. 1 fan	18,040
Return at No. 3 fan	29,500

I found the workings of the mine well ventilated, and as soon as the work of bratticing up the rooms is finished, as per my instructions of March 23 and 24, the mine will be in good condition.

March 25, 1899.—On this date I inspected the machinery belonging to the Cook and White mine, and found the machinery in good condition.

April 22, 1899.—On this date, at about 9 o'clock a. m., I was informed that an explosion had occurred in the Cook and White mine at Madrid, N. Mex. I immediately sent a telegram to the superintendent of the Cook and White Mine, as follows:

JAMES DUGGAN, *Madrid, N. Mex.:*

I will start for mine to-day.

JOHN W. FLEMING.

I immediately got ready and started from Raton, N. Mex., for Madrid, N. Mex., at 12 o'clock m. Arrived at Madrid at 9 o'clock p. m., and on April 23 (Sunday) I

entered the Cook and White mine and went down into the third left main entry and tried to get as far as the face of the entry, but on account of the condition of the entries I could not get to the face of the entries. After coming out of the mine, I wrote the following letter, to wit:

MADRID, N. MEX., *April 23, 1899.*

SIR: A gas explosion occurred here in the Cook and White mine on April 21, at 11.55 a. m., which resulted in the killing of 4 men and 1 boy. I arrived here from Raton, N. Mex., at 9 o'clock p. m., and have been down in the mine to-day, but on account of the timbers and stoppings being blown out of place I could not get to the face of the entries where the men were working at the time the explosion occurred. Men are now working clearing the entries, timbering and repairing the stoppings. The bodies of the men and boy have been recovered. Will report fully as soon as possible.

Very respectfully yours,

JOHN W. FLEMING,
United States Coal Mine Inspector.

COMMISSIONER OF THE GENERAL LAND OFFICE,
Washington, D. C.

April 24, 1899.—I again went down into the Cook and White mine and entered the third left main entry, but on account of falls of rock caused by the explosion I could not get to the face of the main and back entries. I then took air measurements on the slope and left side of the mine, also in No. 3 right entries, which were as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Intake on slope	38,400
Below second right entry on slope	29,280
On slope above air splits, near bottom of slope	29,120
Right return near bottom of slope	17,020
Left return near bottom of slope	10,260
Return from third left main entry to second left back entry	12,960
Between the slant and last crosscut, about 140 feet from the face of the third left main entry	5,600
Return from third right main entry to No. 2 right back entry	13,650
Last crosscut at face of third right entries	5,980
Air traveling outside of slant in third right main entry	13,250

April 25, 1899.—I inspected the second right entries of the Cook and White mine and the workings thereon. I found a fall of rock in the back entry and ordered it cleared up at once. The work was commenced immediately. The air measurements on this date were as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Second right back entry, outside of No. 2 slant	10,560
No. 2 raised plane on second right entry (intake)	3,000
Outside of second raised plane on No. 2 main entry	2,700
Inside of second raised plane	13,200
Top of No. 2 raised plane on second right entry	5,440
Crosscut from No. 14 left room on No. 1 raised plane	7,020
Top of No. 1 raised plane, second right entry	4,800
Crosscut between Nos. 6 and 7 right rooms, No. 1 raised plane	875

On the evening of April 25 the crosshead of the engine which runs No. 1 fan broke, and work was suspended in the Cook and White mine until the engine was in running order. The engine was started April 27 at 11.45 p. m. No persons but the fire bosses were allowed in the mine until the morning of the 28th.

April 28, 1899.—At about 2 o'clock p. m. I was informed that the stoppings along the line of the third left entries, where the explosion occurred, had been repaired as far as the last crosscut. I then went down into the mine and went in as far as the last crosscut on the third left entries and found the main entry full of gas from the crosscut up to the face of the entry, and ordered the men to do no more work until all the men were out of the mine, which would be about 5 o'clock p. m. At 5 o'clock we commenced the work of bratticing the entry with canvas from the crosscut up to the face of the entry, so as to clear it of gas. At 6.30 p. m. the work was completed and I found one of the safety lamps which had been used by one of the men who had been killed in the entry. I also found that all props on which the brattice had been nailed before the explosion had occurred were still standing, but

the brattice cloth had been blown down by the force of the explosion. After the work of bratticing had been completed, I tested the face of the entry with my safety lamp and could scarcely get a trace of gas. I also tested the third left back entry and could only get a trace of gas at the face of that entry. I then took air measurements which were as follows: Intake on main slope, 35,040 cubic feet of air traveling per minute; last crosscut near face of the third left entry, 6,480 cubic feet; face of third left back entry, 3,630 cubic feet; face of third left main entry, 4,950 cubic feet.

April 29, 1899.—On this date I again visited the third left entries of the Cook and White mine and examined them thoroughly, and found another safety lamp. The lamps which I found were in good condition. On this date I again took air measurements, which were as follows:

In the last crosscut near the face of entries I measured 6,480 cubic feet of air traveling per minute; at face of the back entry, 3,630 cubic feet, and at face of main entry 5,850 cubic feet.

The full complement of men for work in the two entries is five, and so far no rooms have been turned. On this date I found small feeders of gas generating at the face of the entries. I also inspected the second left entries and the workings thereon. I found gas in the first dip plane, and upon examination I found the air course which supplies the plane with air very small, and ordered the air course made larger. The superintendent was with me and he immediately put men to work enlarging the air course, and informed me that no more work would be performed on the plane until the air course was enlarged and everything in good condition. I also found the return air course leading from the second left main entry to No. 1 fan in bad condition and ordered it cleared of all falls of rock; also ordered it timbered with good, substantial timbers. The superintendent informed me that the work would be commenced at once. He also informed me that a new air shaft, 9 by 9 feet, was being sunk from the surface to connect with the first left entry, near the face of the entry, and that no more work would be done on the left side of the slope until the air shaft was completed and a first-class fan erected thereon. The work of sinking this shaft was commenced on the 22d day of April. The distance from the surface to the above-mentioned entry is 60 feet, according to survey, and the shaft will soon be connected with the entry.

Under the head of "Fatal accident reports" will be found my report in full of the gas explosion in the Cook and White mine on April 21, 1899.

May 9, 1899.—I again inspected the Cook and White mine and took air measurements, which were as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Intake on main slope	41,760
On slope above No. 3 entries	26,000
Left return near bottom of slope	8,170
Right return near bottom of slope	22,000
Between last crosscut and hauling slant on No. 3 left main entry	6,300
Face of No. 3 left main entry	5,550
Bottom of No. 1 dip plane on second left entry	2,880

I found considerable water in the left return at bottom of slope and ordered it pumped out. The pump was started immediately.

May 10, 1899.—I continued my inspection of the Cook and White mine and took air measurements, which I found to be as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Last crosscut near the face of No. 3 right entries	5,250
Face of No. 3 right back entry	5,280
Intake to No. 1 raised plane	7,875
Return from No. 3 right entry to No. 2 right entry	12,900
Last crosscut at face of No. 2 right entry	4,600
Face of No. 2 right back entry	4,500
Intake to No. 3 raised plane on No. 2 right entry	7,200
Intake to No. 2 raised plane on second right entry	2,400
Intake to No. 1 raised plane on second right entry	6,000

I found the above workings well ventilated and in fair condition.

May 11, 1899.—I continued my inspection of the Cook and White mine. I found No. 1 raised plane on the second left entry, which is the main air course leading from the second left entry to the fan, in bad condition. I then had the back slope opened up from No. 2 left entry to No. 1 left entry, and ordered the pit boss to keep the back

slope opened for an air course until a permanent air course was driven between Nos. 1 and 2 left entries. After the back slope had been opened I took air measurements, which were as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Intake on main slope	42,240
Above No. 3 entries, on slope	32,200
Return from No. 3 left entry to No. 2 left entry	11,900

May 12, 1899.—On this date I again visited No. 2 left entry and No. 1 right entries of the Cook and White Mine and took air measurements, which were as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Bottom of No. 1 dip plane on second left entry	3,200
Back slope or air course between Nos. 1 and 2 left entries	6,150
Last crosscut at face of first right entries	5,670
Return at No. 3 fan	36,120

May 15, 1899.—I inspected the machinery belonging to the Cook and White mine and found the machinery in good condition.

June 6, 1899.—I again commenced my inspection of the Cook and White mine and took air measurements throughout the workings, which were as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Intake on main hauling slope	31,680
On slope above No. 3 entries	30,000
Left return near bottom of slope	7,600
Right return near bottom of slope	17,700
Last crosscut in No. 3 left entries	8,800
Face of No. 3 left back entry	7,050
Face of No. 3 left main entry	4,875
Crosscut at face of No. 3 right entries	9,600
Intake to No. 1 raised plane on No. 3 right entry	6,080
Crosscut between Nos. 1 and 2 left rooms No. 1 raised plane	4,000
Crosscut between Nos. 3 and 4 left rooms No. 1 raised plane	2,400
Return from No. 3 right entry to No. 2 right entry	17,200

I found the workings which I inspected well timbered and in good condition, and, with the exception of the top of No. 1 raised plane, I found the workings well ventilated. I ordered more air forced to the top of the plane. The pit boss informed me that a crosscut was being driven from the third right main entry to connect with No. 1 left room on the plane; also, a door or heavy curtain would be placed across the entry and force all the air up through the workings of the plane.

June 7, 1899.—I continued my inspection of the Cook and White mine and took air measurements, which I found to be as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Intake to No. 1 raised plane on second right entry	7,920
Last crosscut at face of No. 2 right entries	3,480
Intake to No. 4 raised plane on No. 2 right entry	8,150
Intake to No. 2 raised plane on No. 2 right entry	5,400
Top of No. 2 raised plane	5,100
Top of No. 1 raised plane	8,085
Return at No. 3 fan	23,750

I found the workings which I inspected well ventilated and in fair condition.

June 8, 1899.—I continued my inspection of the Cook and White mine and took air measurements, which were as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Top of No. 1 raised plane on second left entry	1,800
Air traveling around the face of Nos. 1, 2, and 3 right rooms on No. 1 raised plane on second right entry	3,600
Crosscut between Nos. 11 and 12 left rooms on No. 1 raised plane	1,400
Intake to No. 3 raised plane on first right entry	12,000
Last crosscut at face of No. 1 right entries	6,450
Return at No. 1 fan	21,600

June 9, 1899.—I again visited the third right entries of the Cook and White mine and found the entries in good condition. I then inspected No. 1 raised plane on the third right entry and found the air course, which was being driven from the third right main entry to No. 1 left room on No. 1 raised plane, completed. I found the ventilation on the plane very much improved. I measured 7,425 cubic feet of air traveling in the air course which is now the intake to the plane, and on June 6 I found only 6,080 cubic feet of air entering the plane. I then took an air measurement up at the top of the plane and found 1,440 cubic feet of air traveling per minute. I found the workings which I inspected well ventilated and in good condition.

June 12, 1899.—On this morning I was informed that roof of No. 1 raised plane on the second right entry in the Cook and White mine had caved where the pillars were being drawn. I immediately went down into the mine and found that the roof had caved back of Nos. 1, 2, and 3 right rooms. I tested the places for gas, but found none, and found the places perfectly safe and in good condition. I then took air measurements throughout the workings, which I found to be as follows:

Cubic feet of air traveling per minute.

	Cubic feet.
Air traveling around the face of Nos. 1, 2, and 3 right rooms, where the pillars are being drawn, on No. 1 raised plane	2,320
Intake on main slope	39,600
Above third right entries on slope	23,000
Left return at bottom of slope	7,000
Right return at bottom of slope	15,300
Last crosscut near face of third right entry	9,920
Crosscut from No. 3 right main entry to No. 1 left room on No. 1 raised plane.	6,750
Top of No. 1 raised plane	1,440
Intake to No. 1 raised plane on second right entry	9,750
Top of No. 1 raised plane on second right entry	8,250

On this date I found the workings well ventilated and in good condition.

DESCRIPTION OF THE PROPERTY SITUATED AT MADRID, SANTA FE COUNTY, N. MEX., AND OWNED BY THE CERRILLOS COAL RAILROAD COMPANY.

At Madrid, Santa Fe County, N. Mex., is one of the most attractive and interesting coal-mining camps in the West. The coal fields offer much that is interesting to the geologist as well as to those interested in coal mining. Here, only a few hundred feet apart, are two mines; the one producing a first-class article of anthracite coal, rivaling the Pennsylvania anthracite; the other one is a bituminous coal, unsurpassed for domestic or steam purposes. More interesting, the bituminous vein lies directly under the anthracite, so that the whole field that has been worked out in the anthracite vein has also been worked out in the bituminous vein 150 feet beneath. More interesting yet, the northern end of the anthracite seam was bituminous coal. This has all been worked out and was known as the famous white-ash coal. The white-ash field comprised about 200 acres.

The mine now being worked in bituminous coal is known as the Cook and White; the one now being worked in anthracite coal is known as the Lucas, both mines being named after the men who first operated them. The coal measures in this field are very numerous, these two being the principal seams. The Cook and White runs in thickness from 3 feet 6 inches to 4 feet 6 inches. The seam dips to the east at an angle averaging 12 degrees. The coal outcrops in the side of the canyon and is worked from a main slope driven in the direction of the greatest dip. The field is then blocked out into 600-foot squares, by side entries or levels, and dip or raised planes, driven off from the entries. The entries are driven in such a direction as will keep them nearly level or approximately at right angles to the slope. The planes are driven sometimes to the raise and sometimes to the dip, but always in a direction parallel to the main slope. The entries or levels are always driven in pairs, to enable a thorough system of ventilation, the top entry or hauling road being separated from the back entry by a pillar of 30 feet of coal, which is known as the double-entry system. Connection is kept up between the back and top entries by a system of crosscuts, the last crosscut always being closed as soon as a new one is made. From the planes, rooms are turned to the right and to the left every 50 feet. These, like the entries, are driven in such a direction as to be level and for a distance of 300 feet and 20 feet wide, with a 30-foot pillar remaining between the rooms, which is taken out in retreating after the rooms have been driven up their full length or when the rooms from two adjacent planes have met. Each plane requires a parting, or side track, and a small engine. These engines are so constructed as to be easily moved from one location to another in the mine, as occasion may require.

Compressed-air power is used in running these engines as well as the pumps in the mine. Each plane, at its best, yields about 200 tons per day and is worked out in from eight to ten months.

The coal collected on the entries at the different planes is hauled by mules to the main parting for that entry, at the main slope, where it is attached to the main cable and hoisted to the surface. The coal is then quickly dumped from the mine cars into the railroad cars, and is soon on its way to the consumer.

The coal is screened into three different grades, namely: The lump, used for domestic purposes; the nut, also used for domestic purposes, and the slack, used for steam purposes. Some of the coal is disposed of unscreened, or "as run of mine," and is used in this condition for heavy steaming purposes where the boiler capacity is limited, as in the case of railway locomotives.

The mine is ventilated by means of two exhaust fans, located one at either side of the mine. The main slope is the main intake for both fans.

The last plane in the first south entry has also been driven out to the surface, which furnishes an auxiliary intake for the air that circulates through the extreme south workings of the entry. The air current coming down the main slope splits, or goes both ways, at the bottom, returning on either side through the workings and up the parallel slopes, which are parallel to the main slopes and 50 feet from it. Each air current then travels its respective side of the mine, through all the workings, and out through by way of the fans. The mine is thus kept thoroughly ventilated through all its parts.

The outside plant consists of the main hoister, small battery of boilers, blacksmith shop, trestle, tipple, scales, etc., and three large air compressors. These, as well as the whole outside plant connected with the Lucas mine, are run by a battery of eight large boilers.

The Lucas seam is the middle one of three coal strata lying close together and which are the top of all the coal measures in this canyon. In some places the three seams are so close together as to be all workable at one time, but as a usual thing only the middle one is mined. This varies in thickness from 3 feet to 3 feet 6 inches, and dips the same as the Cook and White. The methods of working are similar to those of the Cook and White, and the method of ventilation is the same, except that there is one fan instead of two. This fan is located on the north side of the main slope. The air current traveling on the south side of the mine crosses the slope and thus reaches the fan through what is known as the overcast or air-tight wooden box built over the top of the slope and crossing it at right angles. This is at present practically a one-sided mine, as the entries to the north have all been extended to that portion of the vein in which the coal is of a bituminous nature, as has been spoken of above. The prospecting and the work that has been done in the White Ash mine indicates that as the Lucas slope is extended a large field of anthracite coal will be opened up on the north side.

The most interesting part of the outside plant at this mine is the breaker, which name is usually applied to the huge building containing the machinery for crushing and assorting the coal. This building is 250 feet long, 60 feet wide, and 110 feet high. The top of the breaker is on a level with the mouth of the mine. As the coal is hoisted from the mine in pit cars, it is run into the breaker and dumped. On its descent to the storage bins, the coal first passes between two large, rough, iron cylinders, revolving rapidly, and at such a distance apart that the coal is broken up so that the largest pieces weigh from 5 to 6 pounds. This size is known as "grate." The coal then passes through long, cylindrical screens, which are kept slowly revolving. The mesh of the screens vary from one-quarter inch to 4 inches. They are set with one end higher than the other, the coal entering the screen at the higher end, and as the screens revolve the pieces of coal work from the higher to the lower end of the screens, falling through the screen as soon as the part is reached where the mesh is large enough to permit. The different-sized pieces of coal fall into different troughs which lead on down to the storage bins.

There are 15 or 20 boys employed on the breaker as "slate pickers," whose duty is to pick all slate out of the coal as the coal passes through the breaker. They receive 10 cents per hour for their labor. The boys employed on the breaker are from 12 to 16 years of age. The coal is thus graded in the sizes known as "grate," "egg," "stove," "nut," and "pea." The storage bins which hold 75 tons each are filled with the above-mentioned grades of coal. From the storage bins the coal is easily loaded on the railroad cars and shipped to Colorado, Kansas, California, and Mexico.

Owing to the nature of the roof in the mines, a greater portion of the roof has to be supported by timbers where the coal has been taken out. It would doubtless surprise one not acquainted with the workings of a coal mine to see how many cars of timbers are used in the mine each month.

These mines are well equipped for the rapid and safe handling of coal. Electric bell signals are used throughout the workings. Compressed air furnishes the power inside of the mines, and steam outside.

The classes of occupation here are numerous, there being work for the coal miner, timbermen, track layers, rope rider, driver, engineer, machinists, and blacksmith.

The camp is nicely situated, being 3 miles from Los Cerrillos, 15 miles from the gold and copper fields of Ortiz and San Pedro, 35 miles from the Cochiti mining district, and about 25 miles from the city of Santa Fe, which is the capital of the Territory.

The company owns and operates a large store where is kept in stock a large assortment of general merchandise, in fact everything that is needed for the wants of the miner. The miners all dress and live well, buying the best the market affords.

The houses are all owned by the company and rented to the employees. The houses are well built and kept in good repair, and are well suited to the needs of the coal miner and his family. Several hundred shade trees have been set out in the town of Madrid within the last 3 years, which are all growing nicely.

The town supports a city hall, excellent school, and two churches. The greatest disadvantage to work against so far has been the water supply. So far all the water for the town has to be shipped in tanks by railway. The company is now sinking a well in the hope of striking an artesian flow of water, and the indications are that the town will soon have an abundant and unfailing supply of pure water.

OMARA MINE.

[W. P. Gould, lessee.]

This mine is located about 7 miles south of Ortiz Station, which is a station on the Atchison, Topeka and Santa Fe Railroad. Owned by Frederick Muller and is operated by W. P. Gould, lessee. Kind of coal, bituminous; thickness of vein, 4 feet; total output fiscal year ended June 30, 1899, 1,139 tons; estimated value of output, $1,894; depth of slope, 400 feet; average number of men employed, inside, 3; average number of men employed, outside, 4; number of days mine was operated, 225; where coal is marketed, sold to local trade.

This mine is ventilated by an air shaft and has a capacity of 20 tons per day. The coal is hauled in wagons to the railroad at Ortiz Station and shipped to the consumers.

On account of the few men working in this mine I did not visit the mine during the fiscal year. This mine is located in Santa Fe County, N. Mex.

SOCORRO COUNTY.

CARTHAGE MINE.

[Hilton & Luerra, operators.]

This mine is located about 12 miles in a southeasterly direction from San Antonio, Socorro County, N. Mex. Kind of coal, soft bituminous; total output fiscal year ended June 30, 1899, 2,400 tons. Estimated value of output, $5,000; thickness of vein, 4 feet 6 inches; depth of slope, 2,200 feet; value of improvements this year, $600; average number of men employed inside and outside, 3; number of days mine was operated, 225; where coal is marketed, Socorro, Silver City, Magdalena, Belen, and Water Canyon, N. Mex.

The coal is hauled in wagons to San Antonio, N. Mex., and shipped to the different towns above mentioned along the Atchison, Topeka and Santa Fe Railroad. This mine has a capacity of about 50 tons per day, and is ventilated by an air shaft. Considerable development work has been done on this mine and the coal is of very good character, but the cost of hauling the coal 12 miles in wagons to railway station is too great an expense to enable the operators to compete successfully with other mines which are situated more conveniently to market.

RECORD OF INSPECTION.

November 9, 1898.—On this date I visited and inspected the Carthage mine. I measured 2,310 cubic feet of air entering the mine per minute and measured 2,450 cubic feet of air returning per minute. I found the workings well ventilated and the mine in good condition.

SAN JUAN COUNTY.

STEVENS MINE.

[Walter Stevens, general manager.]

This mine is situated near the town of Farmington, San Juan County, N. Mex. Owned and operated by Walter Stevens. Kind of coal, bituminous; thickness of

vein, 15 feet; total output fiscal year ended June 30, 1899, 310 tons; estimated value of output, $310; value of improvements, $80; average number of men employed, 1; where coal is marketed, town of Farmington, N. Mex.; number days mine worked, 100.

THOMAS MINE.

[W. H. Thomas, manager.]

This mine is situated near La Plata, San Juan County, N. Mex. Operated by W. H. Thomas. Kind of coal, bituminous; total output fiscal year ended June 30, 1899, 150 tons; estimated value of output, $150; thickness of vein, from 2 to 4 feet; number of men employed at mine, 2; number of days mine worked, 60; value of improvements, $600; where coal is marketed, town of La Plata and vicinity.

MORGAN MINE.

[George Morgan, manager.]

Located near the town of La Plata, San Juan County, N. Mex. Operated by George Morgan. Kind of coal, semianthracite and bituminous; thickness of veins, 1 vein 3 feet 10 inches and 1 vein 60 feet; total output fiscal year ended June 30, 1899, 250 tons; estimated value of output, $312; number of men employed in the mine, 2; number of days mine worked, 60; where coal is marketed, sold at mine to local trade.

BRUCE MINE.

[R. E. Bruce, manager.]

Located near the town of Fruitland, San Juan County, N. Mex., and operated by R. E. Bruce. Kind of coal, lignite; thickness of vein, 14 feet; total output fiscal year ended June 30, 1899, 100 tons; estimated value of output, $75; number of men employed at mine, 1; number of days mine worked during the year, 60; where coal is marketed, Jewett Valley and Farmington, N. Mex.

The four above-mentioned mines, which are situated in San Juan County, are about 50 miles from any railway. Owing to the great distance from railway and the few men employed, I deemed it unnecessary to visit and inspect the mines. The mines have not yet been developed to any extent, only a few tons being taken out to supply the local demand. From the reports sent in by the operators of the mines, there seem to be good veins of coal, but the distance from market prevents the mines being worked profitably.

Analysis of coal from the White Ash mine of the Cerrillos Coal Railroad Company.

[Made by W. D. Church, December 2, 1893.]

COAL FROM MADRID, N. MEX.

Water	per cent..	2.00
Volatile matter	do....	39.00
Fixed carbon	do....	53.76
Mineral ash	do....	5.24
Total		100.00
Coke	per cent..	59.00
Character of coke		Strong and tough.
Color of ash		Light-yellowish gray.
Character of ash		Soft and light.
Sulphur (as sulphide)	per cent..	0.010
Sulphur (as sulphate)	do....	.022
Phosphorus	do....	.006
Specific gravity		1.410
1 cubic foot weighs	pounds..	88.125
Analysis of mineral ash:		
Silica	per cent..	26.93
Alumina	do....	32.41
Oxide of iron	do....	3.96
Calcium oxide	do....	24.68
Magnesium oxide	do....	10.32
Calcium sulphate	do....	.21
Alkalies and loss	do....	1.49
Total		100.00

COAL FROM RATON COAL AND COKE COMPANY.

Water	per cent..	0.75
Volatile matter	do....	34.40
Fixed carbon	do....	56.93
Mineral ash	do....	7.92
Total		100.00
Coke	per cent..	64.85
Character of coke		Very strong and tough.
Color of ash		Very light ocher.
Character of ash		Soft and light.
Sulphur (as sulphide)	per cent..	0.016
Sulphur (as sulphate)	do....	.022
Phosphorus	do....	.014
Specific gravity		1.291
1 cubic foot weighs	pounds..	88.690
Analysis of mineral ash:		
Silica	per cent..	44.16
Alumina	do....	39.28
Oxide of iron	do....	2.95
Calcium oxide	do....	7.41
Magnesium oxide	do....	3.27
Sulphate of calcium	do....	.41
Alkalies and loss	do....	2.52
Total		100.00

EMPLOYEES.

The following tabulated statement shows the number of miners, day men, and boys employed in and about the coal mines of the Territory of New Mexico during the fiscal year ended June 30, 1899:

Counties.	Miners.	Boys.	Day men.	Total.
Bernalillo	819	11	112	942
Colfax	139	15	100	254
Santa Fe	483	18	79	580
Rio Arriba	33	.....	12	45
Lincoln	24	.....	26	50
San Juan	6	.....	.....	6
Socorro	3	.....	.....	3
Total	1,507	44	329	1,880

In the column headed "Day men" are included all men employed in and about the mines in any capacity, except those actually engaged in mining. During the fiscal year ended June 30, 1898, there were employed in and about the mines of the Territory 1,485 miners, 30 boys, and 373 day men, making a total of 1,888 employees. During the fiscal year ended June 30, 1899, as shown by the above tabulated statement, there were employed in and about the mines of the Territory 1,507 miners, 44 boys, and 329 day men, making a total of 1,880 employees. A comparison of the two fiscal years shows an increase of 22 miners and an increase of 14 boys, but a decrease of 44 day men, making a total decrease of 8 in the total number of employees for the fiscal year ended June 30, 1899.

Production of coal.

Name of mine.	Number of men employed.		Number of tons of coal mined.		Estimated value of product, 1898–99.
	1897–98.	1898–99.	1897–98.	1898–99.	
BERNALILLO COUNTY.					
Gallup	269	275	141,145	151,525	$212,000
Catalpa	68	105	4,356	58,061	81,280
Crown Point	156	123	61,194	45,490	63,700
Sunshine	125	125	48,450	27,723	39,000
Otero	177	172	90,366	96,473	144,709
Thatcher	0	33	0	11,311	16,967
W. A. Clark	80	90	3,500	46,986	73,158
Rocky Cliff	35	10	32,000	5,000	7,500
Stewart	0	9	0	2,000	3,000
Total	927	942	372,611	444,569	641,314
COLFAX COUNTY.					
Blossburg Nos. 4 and 6	360	240	210,000	308,316	462,474
Smith No. 2	8	6	2,972	3,631	7,262
Mesa	5	5	1,000	1,100	2,200
Latamore	0	3	0	600	1,200
Total	373	245	213,972	313,647	473,136
SANTA FE COUNTY.					
Cook and White	285	285	115,000	145,000	230,000
Lucas	142	200	25,000	45,000	105,000
White Ash	127	88	108,000	56,000	89,600
Omara	0	7	0	1,139	1,894
Total	554	580	248,000	247,139	426,494
RIO ARRIBA COUNTY.					
Monero Nos. 1 and 2	45	45	22,500	39,000	51,100
SOCORRO COUNTY.					
Carthage	4	3	1,500	2,400	5,000
LINCOLN COUNTY.					
Old Abe	0	4	0	1,469	2,672
Akers	0	17	0	0	0
Ayers	0	29	0	0	0
Total	0	50	0	1,469	2,672
SAN JUAN COUNTY.					
Bruce	0	1	0	100	100
Thomas	0	2	0	150	150
Stevens	0	1	0	310	310
Morgan	0	2	0	250	312
Total	0	6	0	810	872

Counties.	Output for fiscal year ended June 30, 1899.	Estimated value.	Percentage of output for Territory.
	Tons.		
Bernalillo	444,569	$641,314	42.378
Colfax	313,647	473,136	29.899
Santa Fe	247,139	426,494	23.558
Rio Arriba	39,000	51,100	3.717
Socorro	2,400	5,000	.229
Lincoln	1,469	2,672	.141
San Juan	810	872	.078
Total	1,049,034	1,600,588	100.000

The production for the fiscal year ended June 30, 1899, was 1,049,034 tons, which was an increase of 190,451 tons over the total production of the previous fiscal year.

The total estimated value of the production for the fiscal year ended June 30, 1899, was $1,600,588.

For the fiscal year ended June 30, 1899, there were reported 25 mines in operation, being 5 more than during the fiscal year previous.

From the column of percentages of production it will be seen that the output of coal from the Territory comes practically from 4 counties.

During the fiscal year there were reported to me, as mine inspector, 15 fatal accidents, the causes of which were as follows: By pit cars, 3; by electric wires, 1; by fall of slate, 2; by smothering, 1; by gas explosion, 5; by fall of rock, 3.

The following table shows the number of tons of coal mined for each life lost:

County.	Tons mined.	Lives lost.	Tons of coal mined for each life lost.
Bernalillo	444,569	1	444,569
Colfax	313,647	5	62,729⅖
Santa Fe	247,139	9	27,459⅑

During the fiscal year there were reported to me, as mine inspector, 16 nonfatal accidents, the causes of which were as follows: By fall of slate, 2; by pit cars, 3; by falling, 1; by fall of rock, 5; by fall of coal, 4; by railway cars, 1.

The following table shows the number of tons of coal mined for each nonfatal accident:

County.	Tons mined.	Accidents.	Tons of coal mined for each nonfatal accident.
Bernalillo	444,569	9	49,396⅑
Colfax	313,647	3	104,549
Santa Fe	247,139	4	61,784¾

ACCIDENTS.

Table of accidents of a fatal character reported to me, as mine inspector, for the fiscal year ended June 30, 1899, showing where accident occurred, date, name of person killed, and the cause of death.

Name of mine.	Date.	Name.	Character of injury.	Cause of death.
Blossburg mine, Blossburg, N. Mex.	Mar. 1, 1899	Juan M. Rivera	Body crushed and neck broken.	Fall of rock.
	do	William Lipscomb	Head badly mashed	Do.
	May 16, 1899	Thomas Hermann	Burned	Electricity.
	May 9, 1899	Robert Walker	Neck broken	Fall of slate.
	June 8, 1899	Hugo Shultz	Broken blood vessel.	Fall of rock.
Gallup mine, Gallup, N. Mex.	Dec. 6, 1898	Franz Cadiz	Lacerated leg	Pit cars.
Cook and White, Madrid, N. Mex.	July 26, 1898	Jose Tenario	Fracture of spinal column.	Fall of slate.
	Dec. 14, 1898	Robert Johnson	Body mashed	Pit cars.
	June 29, 1899	Thomas Foster, jr.	Neck broken	Do.
	Apr. 21, 1899	Fred Aira	Concussion and after-damp.	Gas explosion.
	do	John Piva	do	Do.
	do	John Sienowesky	do	Do.
	do	Adam Jerosewiez	do	Do.
	do	Francis E. Watts	do	Do.
Lucas mine, Madrid, N. Mex.	Oct. 6, 1898	Tranquilino Martines.	Fell into coal chute	Smothering.

RECORD OF FATAL ACCIDENTS.

BLOSSBURG MINE.

March 1, 1899.—Juan M. Rivera, about 27 years of age, a miner, nativity, Mexican, was killed in the Blossburg mine, in room No. 2, on the fourteenth right entry. Cause, fall of rock. Also William Lipscomb, age about 40 years, a negro miner, who was working with Juan M. Rivera, was killed by a fall of rock. I made a personal

inspection of the room in which the two men had been killed. I found that they had been engaged in drawing pillars, and had timbered the south side of the room, but had neglected to timber along the north side, where they were drawing the pillars, leaving a space 40 by 15 feet wide without timbers. I made inquiries of the mine boss to know the reason why the deceased men had not used timbers to secure their working places from all danger. The mine boss, and also the fire boss, informed me that they had repeatedly warned and cautioned both deceased men about timbering their working place, and had ordered them to do so, which they promised to do, but they appeared to be anxious to load more coal before they did any timbering, and the roof, which is composed of rock and bone coal, fell upon them, killing them instantly. Both deceased men were unmarried.

Copy of coroner's report.

TERRITORY OF NEW MEXICO, *County of Colfax, ss:*

We, the undersigned justice of the peace and jury, who sat upon the inquest held this 2d day of March, 1899, on the bodies of William Lipscomb and Juan M. Rivera, found in precinct No. 16 of the county of Colfax, find the deceased came to their deaths by an avoidable accident caused by their own neglect.

CHARLES F. PETERSON,
Justice of the Peace.

THOS. THOMPSON,
MAX FRENCH,
AMBROSE COX,
JOHN HADDOW,
GEORGE WILLIS,
PATRICK MCGARVEY,
Jurors.

May 9, 1899.—Robert Walker, negro, a coal miner, about 40 years of age, was killed in room No. 23, entry No. 20 (left), by a fall of slate. I visited the place where the accident had occurred and found that no work had been done in the room after the fatal accident had occurred. I found the room well timbered and in good condition, but a small piece of draw slate which was close up at the face of the coal fell on the deceased while he was working, killing him instantly.

Copy of coroner's report.

TERRITORY OF NEW MEXICO, *County of Colfax, ss:*

We, the undersigned justice of the peace and jury, who sat upon the inquest held this 10th day of May, 1899, on the body of Robert Walker, found in precinct No. 16 of the county of Colfax, find that the deceased came to his death by reason of an unavoidable accident in the coal mines at Gardiner, N. Mex.

CHARLES F. PETERSON,
Justice of the Peace.

J. C. GOOCH,
J. J. ENIS,
HARRY RUFNER,
CHARLES BARNETT,
J. F. WEBB,
SHELTON TREADWAY,
Jurors.

May 16, 1899.—Thomas Hermann, an Austrian, miner, about 35 years of age, was killed on entry No. 20. I investigated the cause and found that the deceased was on entry No. 20 and a mule was coming down the entry with a loaded car. The driver told Mr. Hermann to stand aside and let the mule pass. He (Hermann) struck the mule with a stick of timber and scared it. The mule ran against him, throwing him against the electric wire, and in falling he pulled the positive and negative wires together, the two wires touching each other caused a heavy flash, which burned him, causing death almost instantly.

Copy of coroner's report.

TERRITORY OF NEW MEXICO, *County of Colfax, ss:*

We, the undersigned justice of the peace and jury, who sat upon the inquest held this 17th day of May, 1899, on the body of Thomas Hermann, found in precinct No.

16 of the county of Colfax, in the Territory of New Mexico, find that the deceased came to his death by reason of his carelessness in the Blossburg mine, in the town of Gardiner, N. Mex., by being killed by electric wires.

C. F. PETERSON,
Justice of the Peace.
C. P. JOHNSTON,
H. L. TAPLIN,
J. JENKINS,
LEE BOGARDUS,
THOMAS GREGORY,
JOSEPH JACKSON,
Jurors.

June 8, 1899.—Hugo Shultz, a German, miner and timberman, about 55 years of age, was injured in the Blossburg mine. He was timbering on the main entry and neglected to pull down some loose rock, and the accident occurred while moving a prop to reset same. When he removed the prop, the slate fell on him and broke a blood vessel. He was carried home and died about 9 o'clock p. m. from internal hemorrhage. No coroner's jury.

GALLUP MINE.

December 6, 1898.—Franz Cadiz, an Austrian, miner, 40 years of age, was injured in the Gallup mine, on No. 15 left entry, room No. 7. He and his partner were dropping a car of coal down the plane. The deceased was in front and his partner behind the car. The car stuck, and deceased asked his partner to loosen the sprags, which his partner did, but neglected to put them back in. He was then unable to hold back the car, and, being in front of it, was run against another car that was in front of him, lacerating his leg. The deceased was taken to the hospital and died on December 10 from the effects of his injuries. No coroner's jury.

LUCAS MINE.

October 6, 1898.—Tranquilino Martinez, a Mexican, slate picker, aged 12 years, was injured in the breaker of the Lucas mine. The deceased fell into the pea-coal chute, where he was smothered, breathing only once after being taken out. No coroner's jury.

COOK AND WHITE MINE.

July 26, 1898.—Jose Tenario, a Mexican, miner, 35 years of age, was injured in the Cook and White mine by a fall of slate. He was working in No. 2 raised plane on second left entry, room No. 5, when a fall of rock occurred in the room, fracturing and dislocating the spinal column of the deceased, from the effects of which he died at about 8 o'clock a. m. Deceased left wife and two children. No coroner's jury.

December 14, 1898.—Robert Johnson, an American, trapper, aged 14 years, was injured in the Cook and White by falling under a pit car and having his body mashed, killing him instantly. No coroner's jury.

June 29, 1899.—Thomas Foster, jr., English. driver, aged 21 years, was injured in the Cook and White mine. He was employed as driver and fell off his loaded trip, the cars running over him and killing him instantly. No coroner's jury.

April 21, 1899.—On this date, at about 11.50 o'clock a. m., a gas explosion occurred in the Cook and White mine, causing the death of Fred Aira, an Italian, miner, 32 years of age; also, the death of John Piva, an Italian, miner, aged 39 years; also, the death of John Sienowesky, a Polander, miner, 35 years of age; also, the death of Adam Jerosewiez, a Polander, miner, aged 35 years; and also the death of Francis E. Watts, an American, driver, aged 16 years.

REPORT OF GAS EXPLOSION.

April 21, 1899.—On this date a fatal gas explosion occurred in the Cook and White mine. At the time the explosion occurred I was inspecting the mines which are located in Colfax County, and did not receive the news of the explosion until 9 o'clock a. m., the following morning, April 22. I started on the first train, at 12 m., for Madrid, N. Mex., arriving there at 9 o'clock p. m. on the same day. Upon my arrival at the mine I asked the superintendent of the mine, James Duggan, where the explosion had occurred. He informed me that the explosion had occurred in or at the face of the third left entries; he also told me that on account of the setbolt, which fastens the eccentric rod to the valve stand of the engine, becoming loose, caused the engine which drives the fan to stop. He also told me that the bodies

were all recovered in about three hours after the explosion had occurred; he also stated that two naked lamps were found by the side of the two bodies which had been found in the third left back entry. I then asked him if he could go down into the mine and make an examination of the entries at once. He informed me that there was no work being done in the mine that night, but that men would be working in the entries the following day (Sunday), repairing the stoppings which were blown out by the explosion; also timbering and cleaning up the entries.

On Sunday, April 23, I entered the mine and went down into the third left main entry and tried to get as far as the face of the entries, but, on account of the condition of the entries, I could not get to the face. I found that a number of sets of timbers and all the stoppings along the line of the entries had been blown out by the force of the explosion. I also found four of the stoppings on the slope above the entrance to the third left main entry had been badly shattered, and found that the force of the explosion had traversed across the slope and into the third right entry, breaking down a door which is about 150 feet from the entrance of the third right entry on the slope. I then ordered the pit boss to keep the men at work day and night until the work of timbering, clearing the entries, and repairing the stoppings were completed.

On the 24th of April I again visited the third left entry, but could not get to the face of the workings.

On April 28 I was informed that the stoppings had been repaired up as far as the last crosscut in the entries. I then went down into the mine and went in as far as the last crosscut on the third left main entry, and found the main entry full of gas from the crosscut up to the face of the workings, and ordered the men to do no more work until all the men were out of the mine. At 5 o'clock p. m., when all the men were out of the mine, we commenced the work of bratticing the entry with canvas from the crosscut up to the face of the entry, so as to force the air up to the face and clear it of gas. At 6.30 p. m. the work was completed and I found one of the safety lamps which had been used by one of the men who had been killed, near the face of the entry. I also found that all the props on which the brattice had been nailed before the explosion had occurred were standing, but the brattice had been blown down. After the work of bratticing had been completed, I tested the face of the entry for gas with my safety lamp, and although feeders of gas were generating from the face of the coal, I could scarcely find a trace of gas with my lamp. I also visited the back entry, which is the main air course, and could only get a trace of gas at the face of this entry. On the following day, April 29, I again visited the entries and examined them thoroughly, and found another safety lamp in the third left main entry. The lamps which I found were in good condition. On this date I took air measurements and in the last crosscut found 6,480 cubic feet of air traveling per minute; at face of back entry, 3,630 cubic feet; and at face of main entry, 5,850 cubic feet. The main entry is driven 65 feet beyond the crosscut, and the back entry is driven 68 feet, and the entries are driven about 1,060 feet in length from the slope, which is the main intake or air course for the entries.

I called on Samuel Bailey who was employed as driver in the third right entry at the time of the explosion, and he stated that, at about 11.30 a. m., on April 21, Francis E. Watts, who was then employed as driver in the third left entry, came over into the third right entry and told him (Bailey) that the men in the third left entry were using naked lights, while he (Watts) was compelled to use a safety lamp; and that when any of the bosses came around where the miners were working, the miners in the third left entry would blow out their naked lights and cover the lamps with dirt.

Frank Sherbly, who was working on the night shift in the third left back entry, says that when he finished work on the morning of the 21st, there was no gas in the entry and that the ventilation was splendid.

Eli Perritt, who was working in the back entry with Frank Sherbly, says that he (Perritt) finished work in the entry about 5 a. m. on the morning of the 21st, and when he left the entry in the morning there was no gas at the face of the entry; he further says that the entry was bratticed up to within 8 feet of the face of the workings and everything was in good condition.

George Pugh, who was employed as fire boss in the Cook and White mine, says that he was in the third left entries on April 20, at 1.55 a. m., and found just a very little gas at the face of the back and main entries, but says that there was not enough gas to burn a person if ignited; he further says that the ventilation was splendid and that both entries were bratticed up to within 8 feet of the workings.

Joseph Haske, who was employed as fire boss in the Cook and White mine, says that he was in the third left entries on the morning of the 21st at about 3.30 a. m. and found a very small amount of gas at the face of the entries, and that the air was good and the entries were in good condition.

Henry Aira and Dominick Aira, who are brothers of Fred Aira, deceased, worked in the third left main entry on the night shift, and they say that when they finished their shift at 5.20 a. m on the morning of the 21st there was no gas of any consequence in the entry. I then asked them how their shots were lighted, and they told

me that their shots were lighted by opening their safety lamps and using the naked light. This was strictly against the rules.

J. G. Campbell, who was employed in the Cook and White mine as fire boss, says that on the 14th day of April, while he was making his rounds through the mines, he caught Fred Aira, who was killed by the explosion, using a naked light in the third left main entry, and ordered him (Aira) not to use a naked light any more in that place, as it was strictly against the rules; he further stated that the entries were in good condition and the ventilation was splendid.

William H. Graham, who was employed by the Cerrillos Coal Railroad Company as foreman of the Cook and White mine, says that about 9.30 a. m. on April 21, he was in at the face of the third left entries and found no gas, and found the ventilation good and the entries in splendid condition.

James Duggan, who was employed as superintendent of the Cerrillos Coal Railroad Company, says that about 11.50 a. m. on April 21, a man came running to him and told him that No. 1 fan was stopped, and that he (Duggan) immediately ran as fast as he could to the fan house and as he was passing the main slope, which is the intake of the mine, told the rope rider and his assistant to place canvas over the mouth of the slope, and as soon as he (Duggan) reached the fan house he immediately saw what had caused the fan to stop. He states the cause as follows:

The setbolt that fastens the eccentric rod to the valve stem of the engine became loose, causing the engine to stop, and as the fan is run by a belt from the engine the fan also stopped; the superintendent also states that he got the fan and engine to running almost immediately after arriving at the fan house; that just as he got the fan started the explosion occurred. I called the engineer who was running the engine and looking after the fan and asked him how long the fan was stopped, and he told me that it could not have been more than six or seven minutes. The superintendent, James Duggan, stated that he immediately went down into the mine and organized a rescuing party, and found that the explosion had occurred in the third left entries. That by using canvas brattice on the stoppings they soon got into the entries and found the bodies of the four men and boy who had been killed by the explosion, namely, Fred Aira, John Piva, John Sienowesky, Adam Jerosewiez, and Francis E. Watts, and further stated that naked lamps were found by the bodies of Adam Jerosewiez and John Sienowesky, which were found in the third left back entry and out at the last slant on the entry, which is 114 feet from the face of the entry.

William H. Graham, foreman, also stated that the lamps were found beside the bodies of the above-mentioned men. I asked Mr. Graham who found the lamps, and he told me that he found one and Mr. Duggan found the other; he further stated that the two safety lamps, which the miners used in this entry, were found near the face of the entry.

No. 1 fan is a double 6-foot Murphey fan and ventilates the workings of the mine on the left side of the slope, the air being split at the bottom of the slope. No. 3 fan ventilates the workings of the right side of the mine on the right of the slope.

On my last inspection of the mine previous to the explosion, on March 23, I took an air measurement in the last crosscut which is driven at the face of the third left entries, and I measured 9,680 cubic feet of air traveling per minute through the crosscut, but no work was being done in the entry at this time.

The result of my investigation of the cause of the explosion was the conclusion in my mind that on account of No. 1 fan stopping and the canvas being put over the mouth of the slope the intake was then through the air course from No. 1 fan down through the workings of the mine, on the left of the slope, and in through the third left main entry through the crosscut and out by way of the third left back entry, across the slope and into the third right back entry or air course at the bottom of the right side of the slope, and out through by way of No. 3 fan on the right side. That as No. 1 fan was stopped and the air circulating from No. 1 fan around, as stated above, any gas that was generating throughout the workings on the left side of the mine would naturally be carried around with the air down to the third left entries, and as some gas was generating at the face of the third left entries, considerable gas may have accumulated at the face of the entries during the time No. 1 fan was stopped and before the canvas was placed over the mouth of the slope, and when the air returned down through the face of the workings and into the face of the third left entries, it would carry the gas which accumulated with it out through the third left back entry; and, as the naked lights were discovered at the side of the bodies found in this entry, it is my opinion that the gas was ignited by the naked lights at the point where the bodies were found in the third left back entry, and that the force of the explosion traversed back through by way of the third left main entry, as all the stoppings were blown out into the third left back entry. The men had strict instructions to use only safety lamps, and I am led to believe, from the information received, that they were using naked lights.

In conclusion, I would say that had the men been using safety lamps I feel satisfied that no explosion would have occurred.

Copy of report of coroner's jury.

TERRITORY OF NEW MEXICO, *Santa Fe County, ss:*

We, the undersigned justice of the peace and jury, who sat upon the inquest held this 22d day of April, 1899, on the bodies of Adam Jerosewiez, John Sienowskey, John Piva, Fred Aira, and F. E. Watts, found in precinct 19 of the county of Santa Fe, find that the deceased came to their deaths by reason of concussion and after-damp in the third left entries of the Cook and White mine, in the town of Madrid, Santa Fe County, New Mexico, on the 21st day of April, 1899.

GUS J. JOHNSON,
Justice of the Peace.

JAMES MCGLANGHLI,
J. S. CAMPBELL,
FELIX MURPHY,
PAT BRADLEY,
FRANK SHERBLY,
FRANK FRANKEN,
Jurors.

Table of nonfatal accidents.

Name of mine.	Date.	Name.	Character of injury.	Cause.
Otero mine, Gallup, N. Mex..	Dec. 2, 1898	Mike Sackach	Fracture of femur.	Fall of rock.
	Dec. 3, 1898	Peter Giacomino..	Fractures of femur and patella.	Do.
	Nov. 28, 1898	Antonio Sanchez .	Fingers lacerated.	Railway cars.
Gallup mine, Gallup, N. Mex..	May 12, 1899	James Love.....	Leg lacerated.....	Fall of coal.
	June 2, 1899	John Sheridan....	Knee cap fractured.	Falling.
	June 6, 1899	Joe Cortez.....	Compound fracture of leg.	Fall of coal.
Crown Point mine, Gallup, N. Mex.	Aug. 4, 1898	Francis Wenette..	Dislocation vertebra.	Fall of rock.
	June 6, 1899	Anton Kivlaic....	Lacerated foot....	Fall of coal.
Catalpa mine, Gallup, N. Mex.	June 7, 1899	Chas. Breen.....	Mashed leg.....	Pit cars.
Blossburg mine, Gardiner, N. Mex.	Mar. 2, 1899	Jno. M. Knight ...	Broken rib.....	Fall of slate.
	June 13, 1899	William Lark.....	Broken leg.....	Pit cars.
	June 23, 1899	John Pattie.....	.....do	Fall of slate.
Lucas mine, Madrid, N. Mex..	Nov. 17, 1898	James Dule.....	Partial dislocation of vertebra.	Fall of rock.
	Jan. 1, 1899	Harry Childs	Ribs fractured....	Do.
Cook and White, Madrid, N. Mex.	Sept. 1, 1898	Peter Stoskee.....	Cut in groin	Pit cars.
White Ash mine, Madrid, N. Mex.	Oct. 6, 1898	Antonio Vella	Fractured leg.....	Fall of coal.

RECORD OF NON-FATAL ACCIDENTS

OTERO MINE.

December 2, 1898.—Mike Sackach, a Slav, miner, age 22 years, was injured by a fall of rock on the Holmes entry of the Otero mine. He was sitting on end gate of car going up the entry when a piece of rock weighing about 100 pounds fell from the roof, striking him between the hip and knee, causing a fracture.

December 3, 1898.—Peter Giacomino, an Italian, miner, age 29 years, was injured in the Otero mine by a fall of coal at the face of his room.

November 28, 1898.—Antonio Sanchez, a Mexican, car man, age 24 years, was injured on railroad track below tipple. He was coupling two cars and got caught between the bumpers, having his fingers lacerated.

GALLUP MINE.

May 12, 1899.—James Love, an American, miner, age 29 years, received an injury in No. 11, left entry, room No. 9. The coal fell upon his foot while he was taking down coal, causing contused lacerated wound on right leg.

June 2, 1899.—John Sheridan, an American, driver, age 22 years, was injured in the Gallup mine. He was running to sprag his trips of loaded cars. He stumbled and fell on his knee with such force that he broke his knee cap.

June 6, 1899.—Joe Cortez, an Italian, miner, age 32 years, was injured in the Gallup mine on No. 11, left entry, room No. 6. He was in the act of undermining the coal, when a piece of coal fell on his leg, causing a compound fracture.

CROWN POINT MINE.

August 4, 1898.—Francis Wenette, an Italian, miner, age 43 years, was injured on entry No. 2, room No. 33. This man was knocking out a prop which had been formerly set, believing that it was of no use. When he had knocked out the prop, a lot of loose rock, which was overhanging, fell upon him, causing dislocation of vertebra.

June 6, 1899.—Anton Kivlaic, a Slav, miner, age 19 years, was injured in entry No. 8, room No. 9. While he was in the act of undermining coal, the coal fell on his foot, causing contused lacerated wound of left foot.

CATALPA MINE.

June 7, 1899.—Charles Breen, a Slav, miner, age 24 years, received an injury in entry No. 1. This man was returning from his work after the noon hour and met a loaded trip of cars. He stepped in front of the trip of cars. The cars knocked him down and mashed his leg.

BLOSSBURG MINE.

March 2, 1899.—John M. Knight, an American, miner, age 48 years, was injured on entry No. 7. He was stooping down and a piece of top slate weighing about 20 pounds fell on him, striking him on the small of the back and fracturing one of the smaller ribs on the right side.

June 13, 1899.—William Lark, an American, helper on motor trips, age 24 years, was injured by pit cars. He was employed on the hauling trip as brakeman and was riding on the bumpers between the cars, when one car jumped the track, and in colliding his left leg was caught between the cars and broken just above the knee.

June 23, 1899.—John Pattie, a negro, miner, age 24 years, was injured in the fifteenth left entry, room No. 19. A piece of slate fell on him from near face of room and broke his right leg above and below the knee.

LUCAS MINE.

November 17, 1898.—James Dule, an Italian, miner, age 45 years, was injured in No. 3 right entry by a fall of rock, causing a partial dislocation of first and second lumbar vertebra.

January 1, 1899.—Harry Childs, Englishman, miner, age 32 years, was injured by a fall of rock at bottom of slope. He received a severe strain of back, fracturing ribs—eleventh and twelfth—on right side close to spinal column.

COOK AND WHITE MINE.

September 1, 1898.—Peter Stoskee, an Italian, miner, age 27 years, was injured on entry No. 2, in room No. 2, first raised plane. He was riding out on trip and fell off, receiving a cut in right groin about 8 inches long.

WHITE ASH MINE.

October 6, 1898.—Anton Velia, an Italian, miner, age 40 years, was injured in the new south entry by a fall of coal fracturing his right leg.

Table showing name of mine, method of working, ventilation, power, etc.

Name of mine.	Method of working.	Ventilation.	Power.
Crown Point	Double compartment shaft	Fan	Steam.
Gallup	Slope, double entry, room and pillar	do	Do.
Otero	Drift, single entry, room and pillar	Furnace	Do.
Rocky Cliff	do	do	Horse.
Sunshine	Slope, double entry, room and pillar	Fan	Steam.
Blossburg	Drift, double entry, room and pillar	do	Electricity
Mesa	Drift, single entry, room and pillar	Air shaft	Horse.
Smith No. 2	do	Furnace	Do.
Monero Nos. 1 and 2	Slope, single entry, room and pillar	do	Steam.
Carthage	do	Air shaft	Horse.
Cook & White	Slope, double entry, room and pillar	Two fans	Steam.
Lucas	do	Fan	Do.
White Ash	do	do	Do.
Catalpa	do	Furnace	Do.
W. A. Clark	do	Air shaft	Electricity.
Latamore	Single entry, room and pillar	Natural	Horse.
Old Abe	do	do	Do.
Akers	Slope and three-entry system	Air shaft	Steam.
Ayers	Slope	Natural	White.

During the fiscal year ended June 30, 1899, I did not visit and inspect the four mines located in San Juan County, namely, the Morgan, Stevens, Bruce, and Thomas mines, and the method of working, ventilation, and power used was not reported to me as mine inspector. The said four mines are not, therefore, tabulated in the above table.

MINES NOT IN OPERATION.

Hartsell mine, Colfax County, not operated this year.
Mulholland mine, Bernalillo County, not operated this year.
Smith No. 1 mine, Colfax County, not operated this year.
Sterling mine, Rio Arriba County, not operated this year.
Waldo mine, Santa Fe County, not operated this year.
Miller Gulch mine, Santa Fe County, not operated this year.
Beacon Hill mine, Bernalillo County, not operated this year.
Canavan & Bailey mine, Bernalillo County, not operated this year.
Monero No. 3 mine, Rio Arriba County, not operated this year.

MINES ABANDONED THIS YEAR.

White Ash mine, Santa Fe County, N. Mex.
Lumberton mine, Rio Arriba County, N. Mex.

NEW MINES OPENED THIS YEAR.

Stewart mine, Bernalillo County, N. Mex.
Old Abe mine, Lincoln County, N. Mex.
Akers mine, Lincoln County, N. Mex.
Ayers mine, Lincoln County, N. Mex.
Latamore mine, Colfax County, N. Mex.

Prices paid for labor, mining coal, etc., by the Crescent Coal Company, Gallup, N. Mex.

Mining coal per ton of 2,000 pounds, screened		$0.70
Driving entry	per yard	2.00
Room turning		4.00
Crosscut	per yard	1.50
Timbers	per set	.50
Company men under ground	per day	3.00
Boys attending to doors	do	1.00
Engineers	per month	80.00
Boiler men	per day	2.25
Tipple men	do	3.00
Blacksmiths	do	3.00
Blacksmiths' helpers	do	2.50
Carpenters	do	3.00

Prices of powder and supplies for miners of the Crescent Coal Company.

Powder	per keg	$4.00
Lamp oil	per gallon	1.25
Lamp cotton	per ball	.05
Squibs	per box	.25

Prices paid for labor, mining coal, etc., by the Cerrillos Coal Railroad Company, at Madrid, N. Mex.

Mining coal per ton of 2,000 pounds, screened	White ash	$0.70
	Cook & White	.85
	Lucas	.90
Driving main entry	per yard	3.00
Driving back entry	do	1.75
Driving crosscuts	do	1.50
Driving main slope when in natural coal	do	6.00
Driving main slope when in faults or solid rock	do	9.00
Driving raised planes	do	1.75
Turning rooms off entry and driving room 30 feet		8.00
Setting rough 7-foot timbers		1.00
Setting timbers over 7 feet in length		2.00
Setting 7-foot props		.07

Wages paid:

Pit bosses	per day..	$3.00
Fire bosses	do....	3.00
Tracklayers	do....	2.75
Company timbermen	do....	2.75
General company men	do....	2.60
Single mule drivers	do....	2.60
Team drivers	do....	2.75
Rope riders	do....	3.00
Car couplers	do....	2.75
Assistants to company men	do....	2.00

Prices of powder and supplies for miners of the Cerrillos Coal Railroad Company.

Powder	per keg..	$2.60
Lamp oil	per gallon..	.85
Lamp cotton	per ball..	.05
Squibs	per box..	.25

PRODUCTION OF COKE.

The Colorado Fuel and Iron Company, of Denver, Colo., started the Waldo ovens, at Waldo, N. Mex., on or about the 1st of September, 1898, and also started the Gardiner ovens, at Gardiner, N. Mex., on or about the 1st of November, 1898, and their production up to the end of the fiscal year, June 30, 1899, was 29,586 tons of coke. The coal used at these ovens came from the Starkville mine, Las Animas County, Colo. The coke made at the Waldo ovens runs from 85 to 87 per cent in fixed carbon, 11 to 13 per cent in ash, 1 per cent in moisture, and three-fourths per cent in volatile matter. It takes about 1.55 tons of coal to make 1 ton of coke.

From the Blossburg mine 7,134 tons of coal was made into coke, but the company did not furnish me the number of tons of coke made from this amount of coal.

The coke produced was shipped and sold to the different smelting plants in New Mexico, Arizona, and old Mexico; also to the plants in El Paso, Tex.

Names and addresses of superintendents or managers or pit bosses of the mines of the Territory.

Name of mine.	Post-office.	Officers.
Sunshine	Gallup	W. M. Weaver, general manager; Hugh McGinn, superintendent.
Gallup	do	Do.
Crown Point	do	Do.
Catalpa	do	Do.
Otero	do	Alex. Bowie, general manager; John Stewart, superintendent; James W. Bowie, M. E.
Thatcher	do	Do.
W. A. Clark	do	W. L. Bretherton, agent.
Rocky Cliff	do	Stephen Canavan, manager.
Stewart	do	William Stewart, manager.
White Ash	Madrid	James Duggan, superintendent.
Lucas	do	Do.
Cook and White	do	Do.
Blossburg	Gardiner	James Van Houton, vice-president; J. A. Wiggs, superintendent.
Smith No. 2	Raton	Albert Shaw, manager.
Mesa	do	John Honeyfield, manager.
Latamore	do	G. B. Latamore, manager.
Carthage	San Antonio	Hilton & Luerra, managers.
Monero Nos. 1 and 2	Monero	J. H. Crist, manager.
Omara	Santa Fe	Frederick Muller, manager.
Akers	Gray	T. L. Welles, superintendent.
Ayers	do	Do.
Old Abe	White Oaks	John Y. Hewett, president.

AIR MEASUREMENTS.

The following table shows the number of cubic feet of air entering the mines and returning per minute, measured at intake and outlet:

Name of mine.	Date.	Intake.	Outlet.
Otero	Sept. 26, 1898	12,960	13,750
	Nov. 18, 1898	17,600	18,360
	Jan. 12, 1899	11,670	12,960
	Apr. 13, 1899	15,780	.....
	May 29, 1899	22,150	22,750
Gallup	Sept. 28, 1898	43,740	44,500
	Nov. 19, 1898	27,750	29,960
	Jan. 10, 1899	46,200	47,800
	Apr. 12, 1899	27,400	.....
	May 29, 1899	33,000	.....
Sunshine	Sept. 27, 1898	23,520	24,240
	Nov. 14, 1898	28,800	30,240
	Jan. 9, 1899	25,600	27,840
Crown Point	Nov. 17, 1898	15,510	16,200
	Jan. 11, 1899	16,000	16,800
	Apr. 14, 1899	18,400	.....
	May 27, 1899	7,150	7,650
Thatcher	Jan. 7, 1899	3,840	3,915
	Apr. 16, 1899	5,040	5,460
Rocky Cliff	Nov. 10, 1898	4,320	4,500
	Jan. 4, 1899	3,000	3,255
	May 23, 1899	1,750	1,925
Catalpa	Sept. 23, 1898	8,400	8,640
	Nov. 15, 1898	10,150	11,520
	Jan. 5, 1899	8,910	9,600
	Apr. 10, 1899	7,980	.....
	May 25, 1899	6,300	6,720
Stewart	Jan. 14, 1899	2,160	2,240
	Apr. 6, 1899	2,100	.....
W. A. Clark	Sept. 22, 1898	6,720	6,840
	Nov. 12, 1898	7,560	7,770
	Jan. 6, 1899	4,800	5,440
	Apr. 7, 1899	4,320	4,680
	May 24, 1899	11,200	12,000
White Ash	Sept. 7, 1898	34,760	41,280
	Oct. 11, 1898	38,000	42,000
	Nov. 29, 1898	39,000	40,320
	Dec. 21, 1898	47,600	50,400
	Jan. 23, 1899	40,200	42,480
	Feb. 23, 1899	39,000	40,300
	Mar. 22, 1899	37,800	38,640
Lucas	Sept. 2, 1898	11,000	.....
	Sept. 3, 1898	.....	11,500
	Oct. 12, 1898	12,000	12,250
	Nov. 29, 1898	17,760	19,500
	Dec. 22, 1898	13,720	.....
	Jan. 27, 1899	17,000	18,900
	Feb. 24, 1899	14,880	15,750
	Mar. 27, 1899	14,400	14,700
	May 18, 1899	16,800	18,000
	June 10, 1899	5,040	5,200
Cook and White	Sept. 5, 1898	39,000	45,900
	Oct. 13, 1898	39,200	.....
	Oct. 14, 1898	.....	47,500
	Nov. 26, 1898	39,200	.....
	Nov. 28, 1898	.....	41,000
	Dec. 19, 1898	39,200	43,225
	Jan. 24, 1899	47,520	.....
	Jan. 26, 1899	.....	51,300
	Feb. 25, 1899	43,800	.....
	Mar. 23, 1899	42,000	.....
	Mar. 24, 1899	.....	47,500
	Apr. 24, 1899	38,400	.....
	May 9, 1899	41,760	.....
	May 11, 1899	42,240	.....
	June 12, 1899	39,600	.....
Monero No. 1	Sept. 12, 1898	8,000	8,400
	Oct. 28, 1898	7,600	8,000
	Dec. 9, 1898	8,800	9,200
	Feb. 13, 1899	4,550	4,940
	June 16, 1899	6,300	6,650
Monero No. 2	Sept. 13, 1898	2,340	2,400
	Oct. 26, 1898	2,660	2,680
	Dec. 8, 1898	4,000	4,100
	Feb. 11, 1899	2,700	2,850
Carthage	Nov. 9, 1898	2,310	2,450
Smith No. 2	Dec. 12, 1898	1,520	1,650
	Feb. 18, 1899	2,100	2,170
	May 20, 1899	1,320	.....
	June 28, 1899	2,100	2,205
Mesa	Dec. 16, 1898	1,500	1,560

THE COAL TRADE.

The coal trade has been very brisk during the year, and the demand for the coal produced in the Territory has been much greater than the supply. At Madrid and Blossburg the companies could not fill more than two-thirds of orders received, partly on account of not having the mines developed, but mostly on account of scarcity of miners. Otherwise the production would have been many tons greater.

GENERAL REMARKS.

In my previous annual reports I have made mention, under the above heading, of such matters as I deemed of vital importance to the miner and the mining industry of the Territory, and feel it my duty so to do again, in face of the possible charge and criticism that the subject has heretofore been mentioned.

The thickness of the veins in nearly all of the mines where fire damp is generated is favorable to their proper ventilation, and while gas can not be prevented from generating, it could undoubtedly be prevented in the entries and rooms by having proper ventilation, also by crosscuts being driven more closely together, thus sweeping the gas out as fast as it generates.

Every superintendent and pit boss should make it his imperative duty to provide ventilation as the work advances, and he should not delay until he is compelled to make the proper provisions by allowing gas to form so as to cause severe and disastrous explosions.

Proper care and provisions and the knowledge that "eternal vigilance is the price of safety" would be a safeguard to the investments of the owner, and security for the life and limbs of those employed in the mines.

There are no Territorial laws governing the coal industries of this Territory, and when the importance of the subject is properly represented before the Territorial legislature, certain restrictions should be placed on the matter of handling powder, as well as to the ventilation and other matters, which would insure greater safety and protection to the miners and other persons connected with this growing industry.

In all coal mines throughout the Territory the mine officials have expressed their willingness to comply with all requirements of the United States laws governing coal mining, and the main problem which confronts the mine inspector is to get the miners impressed with the necessity of looking out for themselves and use ordinary precaution in their own behalf.

A coal miner of experience needs no promptings or hints that the roof of his entry or room is in bad condition, and he should not need to be compelled to put in the necessary props or timber to insure his protection, and carelessness in this respect often not only jeopardizes his life, but works to the injury of other miners and to the detriment of the management.

There may be some of the workingmen or miners who would like to express their opinions relative to the ventilation or workings of the mine, and probably some would wish to accompany the mine inspector on his tour through the mines. This the inspector would heartily indorse, and would suggest that the miners select one of their number to accompany him through the mine while inspecting. A complaint may be made that the inspector on visiting the mine always asks for the superintendent or pit boss. There are two reasons why the inspector goes to the superintendent or pit boss.

In the first place, the miner does not wish to lose a day or so of work; and the second reason is that the pit boss is a responsible party for all defects in the working of the mine and is the proper person for the inspector to give instructions and orders to relative to ventilation and timbering at any point that the inspector thinks needs regulating.

But what would materially assist the inspector in the performance of his duty would be for the miners or workmen to adopt a system of reporting the condition of the mine to the inspector. This plan would probably result in a material benefit to the workingmen and could result in no injury to those concerned who intended to comply with the law, and would have a tendency to compel those who are careless to do their duty.

Some of the workmen say that they are afraid to complain to the inspector for fear of being discharged; but this should not be allowed. The inspector has a right to question the workmen, and they should feel that they have a right to furnish information required by the inspector.

In many instances the inspector has found the miners working in their rooms and other working places without having them well timbered, and when ordered to timber their places the miner invariably wants to load a car or two more of coal before timbering, and in many instances while loading the coal the roof falls upon him, either causing a fatal or non-fatal accident. This delay in timbering, in a large measure, accounts for the number of accidents of a fatal and non-fatal character.

INSTRUCTIONS AND RULES.

The following are the instructions and rules under which the Cerrillos Coal Railroad Company mines are to be governed, and all fire bosses will observe the same:

First. Do not remain off of duty without giving the foreman due notice, so that he can put a man in your place.

Second. On beginning your shift's work, your regular daily route will be: Commencing at mouth of slope, travel to face, and return from lower entry in slope to the upper entry in same, making a regular travel in all air courses, and examine all places, including abandoned as well as working places, in each entry, with Davy safety lamps, or such other improved lamps as may be in use at the time.

Third. If you find the brattice or canvas shot down or damaged, repair it at once, so as to conduct the air to the face of the workings as soon as possible, and report in every instance where canvas is shot down to the foreman.

Fourth. Report in writing all places where gas is found; also verbally to foreman.

Fifth. If air courses are obstructed in any way by water or rock, etc., report same in writing and verbally to foreman, that he may remedy it at once.

Sixth. Where roof of air course is bad, and looks dangerous and should be timbered or taken down, report same daily in writing and verbally to foreman.

Seventh. Do not allow any man to go into his place with a naked light where standing gas is found or being generated freely. Give him a locked safety lamp and instruct him to use it instead of a naked light until further advised by you. Any person that you find disobeying this rule, report same to foreman at once, and the miner so disobeying will be discharged from the employment of the company.

Eighth. If you should find a large quantity of gas at any time in the mine between shifts, report same at once to foreman, and do not allow the men to go forward on the slope farther down than lamp house, and the foreman will know from your report how to instruct further.

Ninth. Quantities of gas found in places on account of brattice or canvas shot down should always be removed by the fire boss and not allow the men to enter the place under any consideration until the gas is removed.

Tenth. Instruct men who are working with safety lamps to brush all gas from their places before firing shots.

Eleventh. Any fire found in the mine from shot firing or otherwise must be put out promptly, and call for assistance from any point if you are unable to extinguish it yourself.

Twelfth. Examine and clean all safety lamps thoroughly after each shift's use and do not allow any defective lamps to be taken from the lamp house.

Thirteenth. Any lamps that are damaged by any person using them, or if they fail to return them after the expiration of each shift, report same to foreman and damages will be charged against them.

Fourteenth. Report all places to foreman where you think there is not a sufficient flow of air traveling to prevent the accumulation of gases.

Fifteenth. Travel the main return-air ways daily without fail, and see that same are in perfect condition.

Sixteenth. Put the danger mark (X X) at the entrance of all places that contain any standing gas.

RULES GOVERNING THE CERRILLOS COAL RAILROAD COMPANY MINE FANS.

First. The fireman will attend to the fans when the engineers are off duty.

Second. The engineer when on duty will have full charge of the fans and see that they are properly attended to.

Third. On commencing the shift's work visit the fans and see whether they are in good order or not.

Fourth. If you find any of the fans in bad order notify the master mechanic at once.

Fifth. Do not stop the fan for any slight adjustment while men are in the mine.

Sixth. If either fan should get out of order, so that it is necessary to stop it, close the trapdoor near the fan immediately after stopping the fan, and open trapdoor immediately when the fan is started up again.

Seventh. Notify the foreman before you stop either or both of the fans.

Eighth. Do not stop both fans at one time while men are in the mine unless you see that they will be totally destroyed by continuing to run them, and not then until you notify the foreman to get the men out of the mine.

Ninth. If a sudden breakdown should take place, or you should find one of the fans stopped, notify the foreman at once; then close the trapdoor and notify the master mechanic.

Tenth. In case of breakdown occurring to either of the fans and the master mechanic is not close at hand, the engineer and fireman must do everything within their power to get the fan in operation again as soon as possible.

Eleventh. Fans are to be kept speeded as per verbal instructions given to you from time to time by the master mechanic or superintendent.

Twelfth. Visit the fan every hour and notice if all the working parts are in good order.

Thirteenth. Notice the speed of the fan every thirty minutes.

Fourteenth. If anything occurs to the boilers or steam-pipe connections, or if a sufficient quantity of steam can not be kept up for both fans and hoisting plant, stop hoisting till such time as you can recover and maintain the usual pressure of steam.

RECOMMENDATIONS.

Deeming the present law governing the mining industry in the Territories as inadequate, especially in mines generating fire damp, I beg leave to offer a few suggestions in the way of amendments thereto, as I have suggested and recommended in my previous reports.

First. That the owner or operator of each and every coal mine employing ten or more men should make, or cause to be made, an accurate map or plan of the workings of such coal mine on a scale not exceeding 100 feet to 1 inch, showing the bearings and distances of the workings and the general inclinations of the strata, or any material deflections in such workings, and the boundary lines of such coal mines, which shall be kept for the use of the inspector at the office of said mine in the county where such mine is located, and shall also furnish a true copy of such map or plan to the inspector of coal mines, to be filed in his office; and said owner or agent shall be caused to make, on or before the 10th day of January and July of each and every year, a statement showing the workings of the coal mine or mines. If the agent or owner of any coal mine shall neglect or refuse, or for any cause fail for the period of one month after the time described to furnish said map or plan as above required, or if the inspector should find or have reason to believe the map or plan was inadequate in any material part, he be authorized to cause a correct map or plan of the actual workings of such coal mine, said map or plan to be made at the expense of the owner thereof.

Second. The owner or agent of any coal mine, whether shaft, slope, or drift, shall provide and maintain for every such mine an amount of ventilation not less than 150 cubic feet (where fire damp is known to exist) per minute for each and every person employed in said mine, also an amount of ventilation of not less than 500 cubic feet per minute for each mule or horse used in such mine, which shall be distributed throughout the mine in such a manner as to dilute and render harmless and expel the noxious and poisonous gases from each and every working place in the mine. Break throughs or air ways should be driven at least every 60 feet, or closer if deemed necessary by the inspector, and an air way or break through be made at the face of each and every abandoned room or entry. All break throughs, except those last named, near the working face of the mine, shall be closed up and made air-tight by brattice, trapdoor, or otherwise, so that the current of air in circulation in the mine may sweep to the interior of the mine, where the persons employed in such mine are at work.

Third. Within twenty-four hours after abandonment of any working face in the mine all tracks, ties, and other material, if any, should be taken out, and all entrances and approaches to that particular place should be bratticed up or filled in with "goaf," except openings for ingress and egress of air, and in these two openings, immediately in the openings and not in the room and working face, danger signals should be placed in such a manner that an intruder could not avoid seeing them.

Fourth. All mines to be provided with artificial means of ventilation necessary to provide a sufficient quantity of air, such as fanning or suction fans, exhaust steam, furnaces, or other contrivances of such capacity and power as to produce and maintain an abundant supply of air; but in case a furnace shall be used for ventilating purposes it shall be built in such a manner as to prevent the communication of fire to any part of the works by lining the upcast with incombustible material for a sufficient distance up from said furnace. All mines generating fire damp shall be kept clear of standing gas, and every working place shall be carefully examined every morning with a safety lamp by a competent person or persons before any of the employees are allowed to enter the mine, and the persons making such examinations shall mark on the face of the workings the day of the month and report the condition of the mine at or near the pit top to the superintendent or pit boss; and in all the mines, whether they generate fire damp or not, the doors used in assisting or directing the ventilation of the mine shall be so hung and adjusted that they will shut up of their own accord and can not stand open. The owner or agent shall employ a practical and competent overseer, to be called a mining boss, who shall keep a careful watch over the ventilating apparatus and the air ways, traveling ways, pumps, timber, and drainage; also shall see that as the miners advance their excavations all loose coal, slate, and rock overhead are carefully secured against falling in on the traveling way, and that sufficient props and caps of suitable

length and size are furnished for the places where they ought to be used and placed in the working places of the miners. Such person should measure the ventilation at least three times per week at the inlet and outlet, and also near the face of all entries. A record, on properly printed blanks, should be kept of such measurements, and at the end of each week the mine inspector should be mailed a copy of said air measurements.

Fifth. The mining boss, or other competent person, should make daily inspections of all ropes, chains, cages, and other hoisting apparatus, guides, and shaft timbers, and make a record of such daily inspection in a book kept in the office of such mine for that purpose. The mine boss should keep a daily record of any defect in the ventilating appliances and any standing gas that may be found in the mine, designating the entry or room in which the gas has been found. The record of the aforesaid inspection shall at all times be kept open for the inspection of the mine inspector.

Sixth. I further recommend that bore holes be kept in advance of the face of each and every working place, and, if necessary, on both sides when driving toward an abandoned mine or part of a mine suspected to contain inflammable gases or to be inundated with water, said bore holes to be kept at least 30 feet in advance of the workings.

Respectfully submitted.

JOHN W. FLEMING,
United States Coal Mine Inspector for the Territory of New Mexico.

LAWS GOVERNING THE WORKINGS OF COAL MINES IN THE TERRITORIES.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in each organized and unorganized Territory of the United States wherein are located coal mines, the aggregate annual output of which shall be in excess of one thousand tons per annum, the President shall appoint a mine inspector, who shall hold office until his successor is appointed and qualified. Such inspector shall, before entering upon the discharge of his duties, give bond to the United States in the sum of two thousand dollars, conditioned for the faithful discharge of his duties.

SEC. 2. That no person shall be eligible for appointment as mine inspector under section one of this act who is not either a practical miner or mining engineer and who has not been a resident for at least six months in the Territory for which he shall be appointed; and no person who shall act as land agent, manager or agent of any mine, or as mining engineer, or to be interested in operating any mine in such Territory, shall be at the same time an inspector under the provisions of this act.

SEC. 3. That it shall be the duty of the mine inspector provided for in this act to make careful and thorough inspection of each coal mine operated in such Territory, and to report at least annually upon the condition of each coal mine in said Territory with reference to the appliances for safety of the miners, the number of air or ventilating shafts, the number of shafts or slopes for ingress or egress, the character and condition of the machinery for ventilating such mines, and the quantity of air supplied to the same. Such report shall be made to the governor of the Territory in which such mines are located and a duplicate thereof forwarded to the Secretary of the Interior, and in case of an unorganized Territory directly to the Secretary of the Interior.

SEC. 4. That in case the said mine inspector shall report that any coal mine is not properly constructed or not furnished with reasonable and proper machinery and appliances for the safety of the miners and other employees, it shall be the duty of the governor of such organized Territory, it shall be the duty of the Secretary of the Interior, to give notice to the owners or managers of said coal mine that the said mine is unsafe and notify them in what particular the same is unsafe, and require them to furnish or provide such additional machinery, slopes, entries, means of escape, ventilation, or other appliances necessary to the safety of the miners and other employees within a period to be in said notice named, and if the same be not furnished as required in said notice, it shall be unlawful after the time fixed in such notice for the said owners or managers to operate said mine.

SEC. 5. That in all coal mines of the Territories of the United States the owners or managers shall provide at least two shafts, slopes, or other outlets, separated by natural strata of not less than one hundred and fifty feet in breadth, by which shafts, slopes, or outlets distinct means of ingress and egress shall always be available to the persons employed in said mine. And in case of the failure of any coal mine to be so provided, it shall be the duty of the mine inspector to make report of such facts, and thereupon notice shall issue, as provided in sec. 4 of this act, and with the same force and effect.

SEC. 6. That the owners or managers of every coal mine at a depth of one hundred

feet or more shall provide an adequate amount of ventilation of not less than fifty-five cubic feet of pure air per second, or thirty-three hundred cubic feet per minute, for every fifty men at work in said mine, and in like proportion for a greater number, which air shall by proper appliances or machinery be forced through such mine to the face of each and every working place, so as to dilute and render harmless and expel therefrom the noxious or poisonous gases, and all workings shall be kept clear of standing gas.

SEC. 7. That any mine owner or manager who shall continue to operate a mine after failure to comply with the requirements of this act and after the expiration of the period named in the notice provided for in section 4 of this act, shall be deemed guilty of a misdemeanor, and shall be fined not to exceed five hundred dollars.

SEC. 8. That in no case shall a furnace shaft be used or for the purpose of this act be deemed an escape shaft.

SEC. 9. That escape shafts shall be constructed in compliance with the requirements of this act within six months of the date of the passage hereof, unless the time shall be extended by the mine inspector, and in no case shall the said time be extended to exceed one year from the passage of this act.

SEC. 10. That a metal-speaking tube from the top to the bottom of the shaft or slope shall be provided in all cases, so that conversation can be carried on through the same.

SEC. 11. That an improved safety catch shall be provided and sufficient cover overhead on every carriage used in lowering or hoisting persons. And the mine inspector shall examine and pass upon the adequacy and safety of all such hoisting apparatus.

SEC. 12. That no child under twelve years of age shall be employed in the underground workings of any mine. And no father or other person shall misrepresent the age of anybody so employed. Any person guilty of violating the provisions of this section shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined not to exceed one hundred dollars.

SEC. 13. That only experienced and competent and sober men shall be placed in charge of hoisting apparatus or engines. And the maximum number of persons who may ascend or descend upon any cage or hoisting apparatus shall be determined by the mine inspector.

SEC. 14. That it shall be lawful for any inspector to enter and inspect any coal mine in his district and the work and the machinery belonging thereto at all reasonable times, but so as not to impede or obstruct the workings of the mine; and to make inquiries into the state of the mine, works, and machinery, and the ventilation and mode of lighting the same, and into all matters and things connected with or relating to the safety of the persons employed in or about the same, and especially to make inquiry whether the provisions of this act are complied with; and the owner or agent is hereby required to furnish means necessary for such entry, inspection, examination, and inquiry, of which the said inspector shall make an entry in the record of his office, noting the time and material circumstances of the inspection.

SEC. 15. That in all cases of fatal accident a full report thereof shall be made by the mine owner or manager to the mine inspector, said report to be in writing and made within ten days after such death shall have occurred.

SEC. 16. That as a cumulative remedy, in case of the failure of any owner or manager of any mine to comply with the requirements contained in the notice of the governor of such Territory or the Secretary of the Interior, given in pursuance of this act, any court of competent jurisdiction, or the judge of such court in vacation, may, on the application of the mine inspector, in the name of the United States and supported by the recommendation of the governor of said Territory, or of the Secretary of the Interior, issue an injunction restraining the further operation of said mine until such requirements are complied with, and in order to obtain such injunction no bond shall be required.

SEC. 17. That whenever the terms "owner or manager" are used in this act the same shall include lessees or other persons controlling the operation of any mine. And in case of violations of this act by any corporation, the managing officers and superintendents, and other managing agents of such corporation, shall be personally liable and shall be punished as provided in the act for owners and managers.

SEC. 18. That the mine inspectors provided for in this act shall each receive a salary of two thousand per annum and their actual traveling expenses when engaged in their duties.

SEC. 19. That whenever any organized Territory shall make or has made provisions by law for the safe operations of mines within such Territory, and the governor of such Territory shall certify said fact with a copy of said law to the Secretary of the Interior, then and thereafter the provisions of this act shall no longer be in force in such organized Territory, but in lieu thereof the statute of such Territory shall be operative in lieu of this act.

Approved March 3, 1891.

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